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John Kipling

No 66

THE NEW LAW OF FLUIDS:

OR, A DISCOURSE Concerning the Aſcent of Liquors, IN EXACT Geometrical FIGURES, BETWEEN Two nearly Contiguous Surfaces.

To which is added,

The True State of the Caſe about MATTER's THINKING:

Where it is ſhewn, how very near That Controverſy now is, to a Full and Compleat Deciſion.

By *HUMPHRY DITTON*, late Maſter of the new Mathematical-School in *Chriſt*'s Hoſpital.

LONDON:
Printed by J. ROBERTS; and Sold by AARON WARD, at the *King's-Arms* in *Little-Britain*. 1729.

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TO MY
Much-Eſteem'd FRIEND,
Dr. *Oliver Horſeman*,
M. D. L.
OF
The College of Phyſicians,
LONDON.

SIR,

IF *a Perſon ſo employed, as You are, in the Duties of an* Honourable *and* Arduous *Function, can find Leiſure for a ſmall* Philoſophical *Entertainment; I would intreat Your Acceptance of* This, *from a Friend, who only propoſes by it, to give You a little Diverſion, from thoſe more Intenſe Thoughts* *and Cares, with which Men of* Buſineſs and Character, *do commonly, too much Fatigue themſelves.*

'Tis a great deal that I owe to Your Noble Faculty; *and I ſhall always preſerve a Juſt and Grateful Senſe of the Favours I have receiv'd, whilſt in various Places and Stations of Life,* ſome at the Head of it, *have given, both to my ſelf, and thoſe I am the moſt nearly concern'd for, ample Demonſtrations of* diſintereſted *Care, and* ſucceſsful *Skill.*

But as no General *Acknowledgment of this Nature, can ever acquit me with reſpect to* Your ſelf; *ſo You muſt pardon me, if I am a little more Particular, when very valuable Reaſons oblige me to it.*

Had the Good Man, *the* Friend, *and the Happy* Phyſician, *been leſs Remarkably joyn'd together, than they are, in Your well-known Character;*

racter; it had been a much eaſier Matter, than now it is, to have let You paſs without this ſort *of Notice. But as Matters ſtand, You are not to be let alone, and 'tis the Buſineſs of every conſcious By-ſtander, to* point out *ſuch Qualifications to the World.*

In ſaying this, 'tis true, I take *a Liberty, which You would not be won by any Courtſhip to* give; *but I have this to ſay in my own Defence, that being brought to a* Dilemma, *whether I ſhould break in upon the* Modeſty *of my Friend, or elſe be* Ungrateful; *I reſolv'd of Two Evils to chuſe the* Leaſt, *and by Conſequence ventur'd on the* Former.

I know very well, you'll ſay, I have not choſen right; but I have decided the Point quite another way, and the Proteſtant *Liberty of Judging freely, You are ſenſible is* Mine *as much as* Yours.

However, becauſe I am ſenſible, I ſhall Oblige *You, by inſiſting on this Matter as little as poſſible, and being deſirous to make uſe of all Opportunities of Pleaſing and Gratifying ſuch a Friend; I'll deliver You, for this Time, and only ſubſcribe my Self*

Your moſt Affectionate Friend,

and Humble Servant,

Humphry Ditton.

TO

TO THE READER.

THIS Diſcourſe is grounded upon an Experiment, made ſome time ago, before the *Royal Society*; in which it was obſerv'd, that when Two Glaſs Planes, ſet to a very *minute* Angle, were immers'd with their lower Edges into a Liquid; that then the Liquid riſing between thoſe nearly Contiguous Planes, form'd it ſelf into a curious, and well-defin'd Curve-line, which plainly appear'd to be of the *Hyperbolical* Kind. After my Good

Friend, the late Ingenious Mr. *Hawksbee*, had given me this Account, and I had divers Times ſeen and obſerv'd the *Curve*, as Nature there deſcrib'd it; I began to conſider the Reaſons of the Phenomenon, and *why* it ſhould be ſo. But here the *very diſpoſition* of the Planes, prevented much Thought and Pains: For they naturally preſented a Series of *Tubes* to the Fancy, and (being ſet to an Angle) they preſented a Series of Tubes of *Unequal* Diameters; and (being ſet to a very *ſmall* Angle) they preſented a Series of *ſmall* Tubes, of unequal Diameters. Hence; becauſe they were *ſmall* Tubes, the Liquor muſt riſe to *a conſiderable Height*, diſtinguiſhable upon their Immerſion into it; and becauſe ſmall Tubes of *different* Diameters, therefore the Liquor muſt riſe to *unequal* Heights. And if it were ſo (as Obſervation ſeem'd to confirm, *viz.*) that the *Heights* the Liquid roſe to in ſmall Tubes, were Reciprocally as the *Diameters* of thoſe Tubes; then I ſaw, that of Neceſſity, the *Line* terminating the Extremities of the Aſcending Fluid, between the *Planes*, muſt be the *Common Hyperbola*, and no other. *This*, then, is the *Locus*, which the Fluid deſcribes, when the Two nearly Contiguous Surfaces are *Plane*. But being come thus far, a Man could not well avoid conſidering, into what ſort of *Line* the Fluid would figure itſelf, when the Surfaces were not *Plane*, but *Curvilineal*. For ſince it made an *Apollonian Hyperbola* (as it neceſſarily muſt) when the Diameters of the ſmall Tubes, compoſed a Series of

Primans ; 'twas obvious to enter upon the Speculation of the Nature and Genius of the Curve, when the ſaid Diameters of the ſmall Tubes, compos'd *any other ſort of Series* : That is, when the *Extremities*, of the *Intervals*, of the Two nearly Contiguous *Surfaces*, do not lie in a *Strait*, but ſome *Curve* Line. And it was ſufficient here, to give two or three *Examples* ; premiſing a general Hint, about the Curves that may be *uſeful* this way, and thoſe that cannot. And having thus conſider'd, how a Fluid gradually riſes, in a *Series* of ſmall Tubes, diſpos'd *Parallel-wiſe*, as it is in the Caſe of *Two nearly Contiguous Surfaces* ; I was led to think how it would be, in the Caſe of a Series of ſmall Tubes, *continually inſerted into one another* ; that is, to enquire into the Property of an *Aſymptotical* Pipe, which I have ſpoken a little unto.

The *Uſe* that I have made of this whole Enquiry, is to eſtabliſh hereby, the Certainty of the Doctrine of *Attraction*, of which I take this Phenomenon, (amongſt many others) to be a plain and ſenſible Demonſtration. This I have done in one *General Corollary*; and therein alſo endeavour'd to Anſwer the Objections of *Cavilling*, *Unskilful*, and *Atheiſtical*, rather than ſober, learned and pious) *Doubters* about the Truth of this Doctrine: and I deſire to have it underſtood ſo. If thoſe Gentlemen on either ſide, conſider Matters well, they'll find they have nothing but what's plainly ridiculous to urge againſt it.

In the Diſcourſe about *Matter's Thinking*, ſubjoyn'd to this, I have endeavour'd to bring that Controverſy a little nearer to a Cloſe, with reſpect to one Article, *viz.* the *Unknown* Properties of Matter, than I had done in the *Appendix* to my Diſcourſe of *Chriſt*'s *Reſurrection.* As for the other Articles, I leave them upon the ſame Foot, as there, not ſeeing where to fix them on a ſurer and better; only one *New* Article I add here.

Tho' I know of no *Errata* in the *former* of theſe Diſcourſes that will give a Reader any more Trouble, than the Correcting or Supplying of a Letter here and there, in an ordinary Word: Yet I muſt deſire the *Mathematical* Reader, to correct the *Order* of the Propoſitions mention'd at *Schol. Prop.* IX. (Pag. 31, 32.) after this manner.

Inſtead of *Prop*. III. read *Prop*. V. For *Prop*. V. r. *Prop*. VIII. For *Prop*. IV. r. *Prop*. VII. For *Prop*. VI. r. *Prop*. IX. Again, for *Prop*. VII, & VIII, at *Pag*. 36, & 39, reſpectively, read *Prop*. X, & XI.

Theſe, or whatever other Faults occur, I hope Candid and Ingenuous Perſons will eaſily paſs by, in a Matter ſo *New* and out of the Way as this is.

Advertiſement.

AIR-PUMPS *or* ENGINES *for Exhauſting the Air from Proper Veſſels, with all their Appurtenances, whereby the Various Properties and Uſes of that Fluid in which we Live and Move, are Diſcovered and Demonſtrated by Undeniable Experiments; Engines for the Compreſſion of the Air; Delightful Fountains, in which the Water or other Liquor is made to Aſcend by the Force of the Air's Spring, Syringes and Blow-Pipes, with Valves for Anatomical Injections, Hydroſtatical Ballances, for Examining the Specifick Gravity of Fluids and Solids. The Engine and Glaſſes for the New Way of* Cupping, *without Fire; Scarrificators, which at once make either* 10, 13, *or* 16 *Inciſions. All the above-mention'd Inſtruments, according to their lateſt and beſt Improvements, are Made and Sold by* Francis Hawksbee (*in* Crane-Court, *near* Fetter-Lane, *in* Fleetſtreet, London) *who is the Nephew of the late Mr.* Hawksbee *deceas'd.*

N.B. *That at the ſame Place, and by the ſame Perſon, are ſhewn Courſes of Philoſophical Experiments, under the following Heads, viz.* Mechanicks, Hydroſtaticks, Pneumaticks *and* Opticks: *Alſo* Lectures *read on each Head.*

THE

THE
New Law of Fluids.

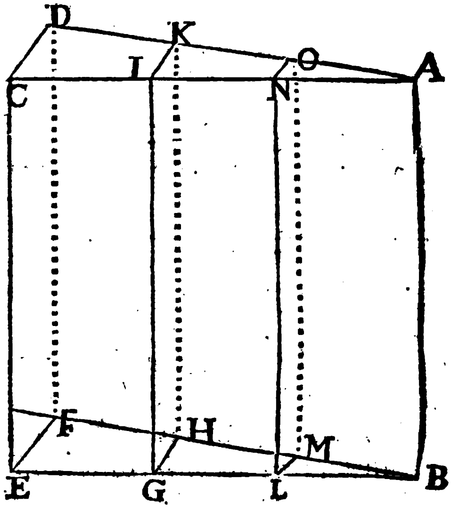
PROP. I.

Two Plane *Surfaces, meeting in a Common Acies, are Equivalent to an Infinite Series of* Small Tubes, *whoſe* Diameters *are the Widths or Diſtances of the* Planes *at the ſeveral Points; and the Common Altitude of all, the Acies or Section of the Two Planes.*

DEMONSTR.

AT Fig. 1. the Two Rectangular *Glaſs* Planes meet in the Common *Acies* AB, and make with one another the Angle FEB = DAC exceeding ſmall; Then drawing the Rectangular Planes EFCD, GHIK, LMNO, &c. all Parallel to the Acies AB; 'Tis evident, that at the Points

FIG. 1.



LM, the Planes act as the ſmall Tube LMNO, whoſe *Diameter* is LM the Width of the Planes at thoſe Points, and *Height* LN = MO = AB. So at G and E, the Planes are Equivalent, to the Tubes GHIK, EFCD, whoſe Baſes are the Widths GH, EF reſpectively, and Heights GI, EC = AB. Therefore the Whole is Equivalent to an Infinite Congeries of little Tubes, &c. Q. E. D.

COROLLARY I.

Therefore at what rate ſoever the Fluid would riſe, in a Congeries of ſmall Tubes, whoſe Diameters were the Parallels EF, GH, LM, &c. after the ſame manner muſt it riſe between the Two *Planes*.

And what *Line* ſoever, whether *Strait* or *Curve*, the Higheſt Points of the Liquid would compoſe, in ſuch a Series of ſmall Tubes; the *ſame Line* muſt the Aſcending Liquid form between the Two Planes.

COROLL. II.

The *Leſs* the Angle comprehended between the Two Planes, the Higher above the bottom Edges BF, BE, will the *Line form'd by the Aſcending Fluid*, lie on the Surface of thoſe Planes.

COROLL. III.

The Diameters of the Tubes, are directly as the Diſtances from the Common *Acies* of the *Planes*; EF : GH :: EB : GB, &c.

SCHOL.

In *Geometrical* ſtrictneſs, the Lines LM, GH, EF, &c. are not the real *Diameters* of the *Circular Baſes*, of a Series of little Tubes ſtanding in this order by one another; but they are the *Chords* of *Similar* Arches in thoſe Circles, and are therefore *Proportional* to the Diameters; otherwiſe the Lines FB, EB, cannot be *Tangents* to thoſe little Circles, in the Points EGL, &c. F, H, M, &c. for which reaſon, the aforeſaid Ordinates LM, &c. can't in rigour be Diameters. However as in *Geometrical* Strictneſs, they are *Proportional* to the Diameters; ſo if the Angle EBF be exceeding ſmall, and the Diſtances EG, GL, &c. exceeding ſmall alſo; they may ſafely (in *Calculation*) be taken for Diameters.

PROP.

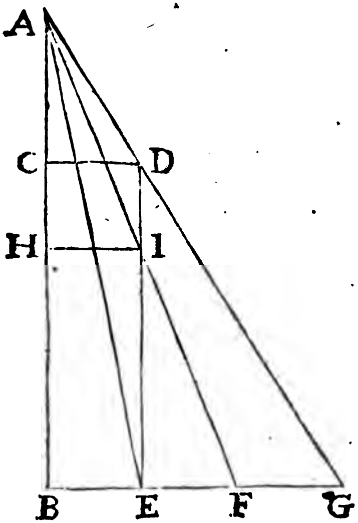
PROP. II.

The Height of the Liquid *being given, at any determinate Diſtance from the* Acies *of Two Planes, whoſe* Angle *is alſo given: 'Tis required to find, at what* diſtance *from the* Acies *of Two other Planes, whoſe Angle, is in any given* Multiple *Ratio of the Angle of the former Planes, the Liquid ſhall riſe to the ſame Height, as in the Former.*

AT Fig. 2. let ABG be a *right* Angle, and let *Angles* BAE, BAF, BAG repreſent the various *Planes*, whoſe Common *Acies* is A.. Alſo let the Angle BAF = 2 BAE, and BAG = 3 BAE. From E draw DE $\parallel^{l}$ to AB, and interſecting the Lines AF, AG, in the Points I, D, from whence carry DC, IH, $\parallel^{l}$ to BG, and cutting AB, in the Points C and H.

Becauſe AE *biſects* the Angle BAF, ∴ BE: EF :: BA: AF, and BE: BF :: BA: BA + AF :: *Rad*: Rad: + Sec^{t}. BAF, and ſince HI = BE ∴ HI: BF ::

FIG. 2.



Rad: Rad: + S, BAF, and HI: BF:: AH: AB ∴ AH: AB:: R:R+S, BAF. So that if the Fluid ſtands at any determinate Height whatſoever, between the Planes AB, AE, at the given Diſtance AB from the *Acies* A; then it ſhall ſtand at the *ſame height*, between the Planes AB, AF, (whoſe Angle is *double* the former) but at a much leſs Diſtance from the *Acies*, viz. the Diſtance AH, which is to AB, as the *Radius*, to the Aggregate of the *Radius*, and the *Secant* of the *double* Angle BAE, and therefore given. 'Tis evident, that the Fluid muſt riſe to the *ſame* Height, at the *diſtance* AH, between the Planes AB, AF; as it does, at the Diſtance AB, between the Planes AB, AE: becauſe (*Conſtruct.*) BE=HI, and the Planes acting there as little Tubes of thoſe Diameters, which are *equal*, the Liquid conſequently riſes to the ſame Altitude in both places.

If the Angle of the Planes BAG were *triple* of BAE; then between thoſe Planes, it will be *but* at the Diſtance AC from the *Acies* A, that the Liquid will ſtand at the ſame height, that it does between the Planes BAE, at the much *greater* diſtance AB.

And to determine AC; as before, we have BE : EF :: BA : AF, and EF : GF :: AE :: AG :: Sec. BAE : Sec. BAG, and EF : EG :: S,BAE : S,BAE + S,BAG, ∴ $EF = \frac{EG \times S,BAE}{S,BAE + S,BAG}$ ∴ (ſince BE : EF :: BA : AF :: R : S,BAF, 'tis alſo) BE : $\frac{EG \times S,BAE}{S,BAE + S,BAG}$ :: R : S,BAF, from

whence

whence it follows, that $BE:EG::R\times S,BAE:\overline{S,BAE+S,BAG}\times S,BAF,\therefore BE:BG::R\times S,BAE:R\times S,BAE+\overline{S,BAE+S,BAG}\times S,BAF.$ That is, CD to BG, is in this *Ratio*. But CD: BG:: AC: AB, ſo that at laſt, we have AC to AB, as *Rad*: into the *Secant* of the ſingle Angle; to the Product of *Rad*: into the Secant of the *ſingle* Angle, added to the Product, of the Secant of the *ſingle*, into the Secant of the *double*, and the Secant of the *double* into the Secant of the *triple*; which is eaſily done by the *Tables*.

And after the ſame manner we may proceed (tho' ſtill by a more *Complicated* Operation) to do the like for *Planes*, whoſe Angles are in any given *Multiple* Ratio, of the given Angle BAE, Q.E.I.

The like may be done alſo, by the *Tangents* thus. Let AB be divided in *H*, as the Tangent of the *ſingle* to the Tangent of the *double* Angle, and in *C*, as the Tangents of the ſingle and treble; or, which is the ſame thing, AH in *C*, in the Ratio of the Tangents of the double and treble. And ſo on.

PROP.

PROP. III.

The Heights to which the Fluid riſes in a ſett of ſmall Tubes, of different Sizes, are in ſome certain, conſtant, Reciprocal *Proportion, or Relation, to the Diameters of their Orifices.*

BY *certain* or *conſtant*, I mean a Law that holds *uniformly*, in Tubes of all Sizes and Diameters. So that if *ex. gr.* the Heights to which the Liquid riſes, are any where found, to be as any *Dignities* or Powers of the *Diameters*; we may conclude that the ſame Law obtains every where, or that the Altitudes of the Liquor in other ſmall Tubes, are as the ſame Powers of the Diameters.

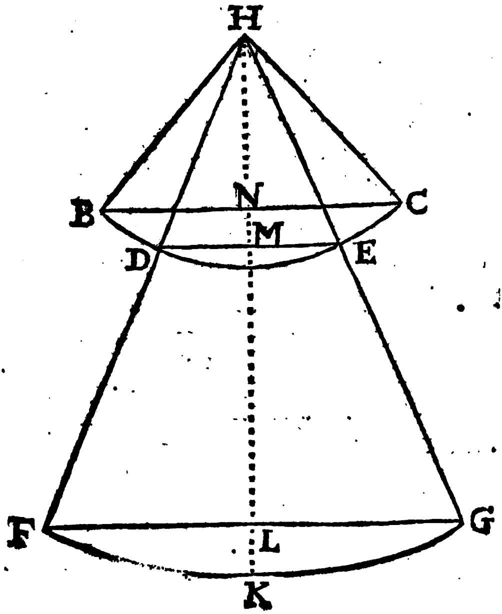
And that this Relation or Proportion, muſt be a *Reciprocal* one, is moſt evident: ſince the *bigger* the Tube, the *leſs* the Height of the Fluid, and *vice verſa*; as Experience and Demonſtration both aſſure us.

PROP. IV.

To find the Proportion of the Heights, to which the Fluid riſes, at various Diſtances, from the Common Acies, of Planes which have different Apertures.

AT Fig. 3. let H repreſent the Common Acies of the Planes BH, HC,

FIG. 3.



and FH, HG; whoſe Apertures are expreſs'd by the Angles BHC, FHG, reſpectively; which I ſuppoſe ſo poſited, that the Common Perpendicular HK *biſects* each of them.

Draw the Chords BC, DE, FG, which are therefore biſected by HK in N, M, L.

Put the Height of the Fluid at C (between the Planes BH, HC) $= A$, that at E (between the Planes FH, HG) $= a$, that at G (between the ſame) $= \alpha$.

Let us compare the Altitudes of the Liquid now, at the Points C and G. 'Tis plain that $\frac{A}{\alpha} = \frac{A}{a} \times \frac{a}{\alpha}$

Now (by Prop. 3.) $\frac{A}{a} = \frac{DE^n}{BC^n}$, and $\frac{a}{\alpha} = \frac{HG^n}{HE^n} \therefore \frac{A}{\alpha} = \frac{DE^n \times HG^n}{BC^n \times HE^n}$, ſo that $\alpha : A :: BC^n \times HE^n : DE^n \times HG^n :: BN^n \times HE^n : DM^n \times HG^n ::$. That is, *the Heights of the Fluid, are in the Reciprocal Ratio of* ſome Power *of the Diſtances, com-*

compounded with the Reciprocal (of the ſame Power) *of the Sines of the half Apertures.* Q. E. I.

PROP. V.

If in ſmall *Tubes, the* Heights *to which the Liquid riſes, be* reciprocally *as the* Diameters *of the Baſes of thoſe Tubes; Then between the* Two Glaſs Planes, *the Liquid muſt neceſſarily riſe in the Curve of the* Common Hyperbola.

DEMONSTR.

AT Fig.4. let D F, and G I, be the reſpective *Altitudes* of the Fluid, between the Glaſs *Planes*, at the Points D and G, from whence draw the $\parallel^{ls}$ DE, GH.

Becauſe $DA > GA$, and $\therefore GH < DE$, the *Fluid* will riſe higher at G than at D; that is $GI > DF$.

But becauſe $GI : DF :: DE : GH$ (by the *Hypotheſis*) and $DE : GH :: DA : GA$ ($S^r. \triangle^{ls}$) $\therefore GI : DF :: DA : GA$; or the $\square\, GI \times GA = \square\, DF \times DA$.

Wherefore the Points F, I, are in the Curve of an Hyperbola, whoſe *Centre* is A, and *Aſymptotes*, CA, BA.

The like may be prov'd of any other Points, at which the Liquid ſtands between the Planes. Therefore, *&c.* Q. E. D.

SCHOL. I.

Our *Hypotheſis* here is, *that the Heights of the Fluid, in ſmall Pipes of different Bores, are Reciprocally as the Diameters.* And this I think is pretty agreeable to *Obſervation and Experience.* If this be really ſo, the Curve muſt neceſſarily be the *Apollonian Hyperbola*, and can be no other. As on the other Hand, if the Curve (by *Experiment*) appears to be the *Apollonian Hyperbola*, the *Heights* muſt neceſſarily be Reciprocally as the *Diameters.*

SCHOL. II.

The Angle CAB or CAQ being a *right* one; the *Hyperbola* form'd by the *aſcending Fluid*, is an *Equilateral* one. And the *Aſymptotes* are always, the Lines

AC, and AB or AQ; that is, the Common *Acies* of the Planes, and the *Baſe* or *Ground-line* of them. Which is evident, not only from the *Proportion* before laid down in the *Demonſtration*, but alſo from the very Conſideration of the Thing it ſelf. For becauſe the Planes open and approach to Indefinite *wideneſs*, towards the Parts of B and Q; therefore that way, the Heights of the Liquid approach towards Indefinite *ſmallneſs*; that is, the *Curve* form'd by thoſe *Heights*, approaches *nearer and nearer*, to the Line AB, but can never meet with it; becauſe at an Indefinitely great *diſtance* from A, where the *width* of the Planes is conſequently Indefinitely *great*, the Height of the Fluid is but Indefinitely *ſmall*, but not nothing at all. For the ſame Reaſon, the Height of the Fluid approaches nearer and nearer towards Indefinitely Great, as we come towards AC, the *Common Acies* of the Planes.

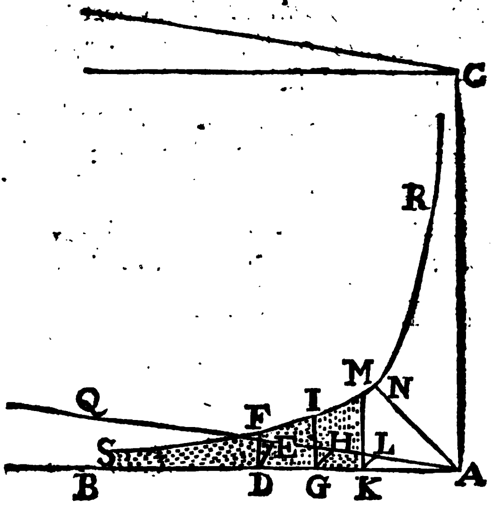
PROP.

PROP. VI.

The (Rectangular) *Planes opening, to various Angles; I ſay that the Tranſverſe Diameters, of the ſeveral Hyperbola's form'd by the Aſcending Fluid; are in the Reciprocal Subduplicate Ratio, of the* n *Powers of the Sines of the half Apertures, taken at the ſame diſtance from the Common Acies.*

WE will ſuppoſe at Fig. 4. the Planes to ſtand at any Aperture as BAQ,

FIG. 4.



and ſo the Hyperbola form'd by the *Liquid*, to be RFS. We will take alſo at liberty, the *Diſtance* AG from the *Acies* or Section of the Planes; the *Height* of the Fluid at that point G being GI. Now the Angle BAQ being *augmented*, (that is, the Planes ſet to a greater Aperture) the Height of the Fluid at the ſaid Point G, or Diſtance AG, will be leſs than GI.

Put this Altitude $= \pi$, and the Semitranſverſe, of the Hyperbola form'd by the new Aperture, $= \tau$. Having biſected the Angle CAB, by AN, N is the Vertex, and AN the *Semitranſverſe*, (or being an *Equilateral* Hyperbola) the *Semiconjugate* or *Semiparameter*, of the Hyperbola RFS.

Now $2\,IG \times GA = AN^q$, and $2\,\pi \times GA = \tau^q$; ſo $AN^q : \tau^q :: IG : \pi$. But by Prop. 4. ſince the Diſtance is the ſame, (ſee Fig. 3.) $IG : \pi :: BN^n : DM^n$, $\therefore$ $AN^q : \tau^q :: BN^n : DM^n$, $\therefore$ $AN : \tau :: BN^{\frac{n}{2}} : DM^{\frac{n}{2}}$. Q. E. D.

COROLL.

The greater the Aperture of the Planes, the nearer does the Vertex of the *Hyperbolically* form'd Fluid approach to the Point A.

SCHOL.

If according to the Obſervation made at *Schol.* I. *Prop.* V. we ſuppoſe the *Heights* of the Fluid to be Reciprocally, as the very *Diameters* or *Apertures* of the Planes themſelves; this preſent Propoſition (however we have provided for the Univerſality of it, by expreſſing it in the Terms of an *Indetermin'd* Exponent) will yet run more elegantly and conciſely thus, viz. *That the Tranſverſe Diameters of the ſeveral Hyperbola's will be in the Reciprocal Subduplicate Ratio of the Sines of the half Apertures.*

SECT. II.

Hitherto we have only ſeen into what *Figures* Liquids do riſe, when the Surfaces between which they aſcend, are *Plane* or *Rectilineal.* We may now not unprofitably carry the ſame Speculation to Curvilineal Surfaces alſo, and ſee *what Laws, what certain Rule or Order*, Nature obſerves there in the ſame Operation. But now ſince the Phenomenon requires in order to its Production, that the Surfaces between which the Fluid riſes, be *proximè*, contiguous to each other; and ſince this can't be obtain'd with equal Exactneſs, in all ſorts of Curvature; it will not be amiſs if we enter a little into the Conſideration of this Matter, and ſhew what Curve Surfaces may ſerve us here, and what not.

And there is no doubt, in the firſt place, but that for the ſake of *eaſy and commodious Calculation*, we ought to have one *continued Curvature in the two Surfaces*; ſo that they ſhould be *both*, the regular Production or Continuation of one and the ſame Curviline Figure, and not *two different, diſcontinued, or diſproportional Segments* of the ſame Curve clapt together, or adjuſted to one another. For though there would be an Infinite Variety of Phenomena ariſing this way, yet the Computations would be *more tedious and perplex'd*, than the Knowledge gain'd from them would make amends for; unleſs ſome particular Caſe ſhould happen, where, upon ſome Account of Conſequence, it ſhould be neceſſary to purſue ſuch an Enquiry. Beſides, the *neatneſs and elegancy* of the Problem would ſeem to be loſt, by patching various Pieces of Curve Surfaces together, or *making ſtrait and cloſe Intervals, by arbitrary Adjuſtment and Appoſition of Parts* (in order to raiſe Fluids) where Nature has not made any Approximation, in the regular Duct and Formation of a Curve.

In the next place, 'tis evident, that the Curvatures fit to anſwer our End, muſt be ſuch and ſuch only, *as together with ſome determinate finite Length, or Prolongation, will admit of Indefinitely ſmall Latitude or Narrowneſs.* That is, ſuch whoſe *Axes* or *Abſciſſes* being of ſome real finite Magnitude, their greateſt *ordinate* or *breadth* (taken at that determinate Length of the Axis) may be Indefinitely ſmall, or of a ſmallneſs fit to anſwer the preſent Purpoſe of the *Riſe of Fluids.*

And here it ſoon appears, that amongſt all the Kinds of Curves commonly conſider'd by us, thoſe of the *Conical kind* alone, can anſwer the Condition here propos'd.

I may *ex. gr.* have a *Parabola*, or *Paraboliform* Curve, which, together with an *Axis* of ſome determinate Magnitude, ſhall have its *baſe ordinate* Indefinitely ſmall; and the whole Space conſequently Indefinitely ſtrait and narrow: the like may be obtain'd in the *Elliptical* Sorts of Curvature, and in the *Hyperbolical* too, as is evident from the Nature and Properties of thoſe Figures. But I can't poſſibly have a *Trochoid* ex. gr. with an Indefinitely narrow Baſis, and an Axis (at the ſame time) of a finite determinate Length: Nor will the Nature of any *Ciſſoid* or *Quadratrix* allow any ſuch thing. In all theſe Sorts of Curves, there is ſo reciprocal and cloſe a Relation between *Axes and Baſes*, as to their Magnitudes and Dimenſions; that the *one* cannot poſſibly be Indefinitely ſmall, but the *other* will be ſo likewiſe. And therefore no *Indefinite Narrowneſs*, in conjunction with *Determinate Length*, is to be obtain'd from thoſe Kinds of Curvature; nor are they conſequently of any uſe in our preſent Enquiry, into the *Riſe of Fluids* between two contiguous Surfaces.

LEM. I.

If a Cylindrical Superficies be erected upon any Curve-line (of Indefinitely ſmall Latitude with Determinate Length) as a Baſis; *the two nearly approximating Sides of the Curve Surface*, will be *equivalent to a Series of ſmall Tubes, whoſe Diameters are the Ordinates of the Curve in the Baſis.* This may be prov'd as *Prop.* I.

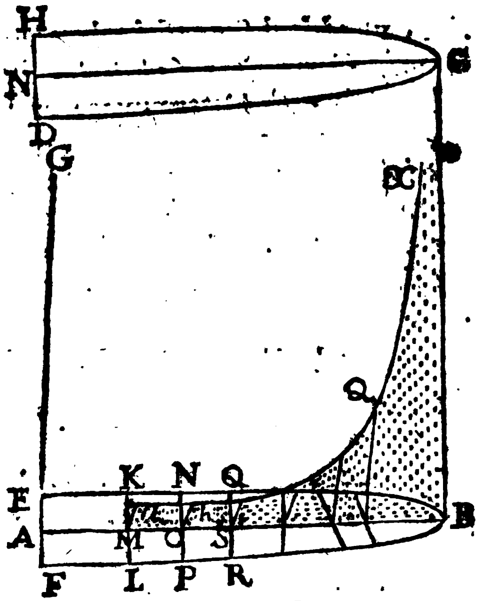
LEM. II.

The extream Points of the *Aſcending Fluid*, are to be conſider'd as lying in a Perpendicular Plane, paſſing thro' the Axis of the Curve in the Baſis.

PROP. VII.

If in a Series of ſmall Tubes, *any Powers of the Heights, to which the Liquid aſcends, be* reciprocally, *as any Powers of the* Diameters *of the ſaid Tubes: Then if a* Cylindrieal *Surface be erected upon a Baſis, which is any one of* Paraboloid *Curves; the Liquid ſhall always riſe in one of the* Hyperboloids, *between the nearly contiguous Sides of that Surface.*

FIG. 5.



DEM.

THE Superficies is DHCBFE (Fig. 5.) whoſe Baſis EFB (=HDC) is not a *Triangle*, as 'tw[illegible]s before in the Caſe of the *Two Planes*, but ſome *Curvilineal* Area, whoſe *Axis* is AB, and Ordinates KL, NP, QR, &c.

The Line BC, which is *Perpendicular* to the *upper* and *lower* Planes, at the Points C and B, which are the *vertexes* of the Curves; is what I do (by way of *Similitude*) call the *Acies* of the two half *Cylindrical* Surfaces HCEB, and DCFB: tho' 'tis certain that the ſaid Curve Surfaces, do not *cut* one another in thoſe Points B, C, becauſe on both Sides 'tis all *one continued Curvature.* The *Perpendicular* Plane paſſing thro' this *Acies* and the *Axes* of the Curves, is NCAB; and it is in this Plane, that I ſuppoſe the Curve, form'd by the *Aſcending* Fluid, to be eſtimated.

Let the *Altitudes* of the Liquid, at the Points M, O, S, &c. be Ma, Oh, Sc, &c. reſpectively.

Now ſuppoſe theſe *Altitudes* at the Points M, O, &c. to be proportion'd to the *Diameters* of the *ſmall* Tubes, which are the *Ordinates* MK, ON, &c. that $Ma : Oh :: ON^p : MK^p$.

Alſo let the Nature of the Curve be ſuch, that $MK : ON :: MB^r : OB^r$. where the *Exponents* p, r, may be either *Integers* or *Fractions*, and ſo the Expreſſions, in all reſpects, be *Univerſal.* Then

$Ma : Oh :: ON^p : MK^p$ (Hypoth.)

$MK : ON :: MB^r : OB^r$ (by the Nature of the Curve.)

$\therefore ON^p : MK^p :: OB^{rp} : MB^{rp}$

$\therefore Ma : Oh :: OB^{rp} : MB^{rp}$, From whence it appears, that the Points a, h, c, &c. are in the Curve of an *Hyperboloid.* Q. E. D.

COROLL.

It appears from hence likewiſe, that the Fluid can never poſſibly riſe in the *Common Hyperbola*, if the Baſis be any *Parabolick* Curve; ſuppoſing that Proportion to obtain between the *Altitudes* and *Diameters*, which was mention'd *Schol.* I. *Prop.* III. For if according to that *Schol.* the Exponent p be always $= 1$, then ſince from the Nature of the Paraboloidical Curves, r can never be $= 1$, it follows that rp or $r \times p$ cannot $= 1$; and therefore that the Curve of the Liquid in any ſuch Caſe, cannot be the Common Hyperbola.

SCHOL. I.

Hence we ſee how *Nature*, in theſe Sort of Operations, affects Curves of the *Hyperbolical* Kind.

In the Motions of the *Planets*, ſhe is all upon *Ellipſes*. In thoſe of *Terreſtrial Projectiles* ſhe deals entirely in *Parabola's*.

In conducting Solid Bodies, and even *Rays of Light*, the ſhorteſt and eaſieſt Courſe thro' ſome Refracting Liquids, ſhe carries them thro' *Cycloids*. And here, in raiſing up of *Fluids*, ſhe deſcribes *Hyperbola's*.

Oh wiſe Geometrical Nature! May we trace thee in like manner thro' the reſt of thy Paths?

SCHOL. II.

If the Curve EKBLF, the Baſis of the *Cylindroid*, were of ſuch a Nature, that the Property ran thus (for example) *viz.* $MK^r : ON^r :: AM^n \times MB : AO^n \times OB$; then the *Curve of the Liquid*, will be of quite another Sort than in the foregoing Caſe: In order to the better underſtanding the Nature of which, the following Things are to be obſerv'd.

1. That the Curve EBF in the *Baſe*, is, from its *ſuppos'd* Property, a *Recurrent* one, or ſuch whoſe *Ordinates*, at the Points A and B, do vaniſh.

The *Equation* of it (if we put $AB = a$. $BO = x$. $ON = z$.) will be $z^r = \overline{a-x}^n \times x$; where if either x becomes

o, or

0, or equal to *a*, the *Ordinate* z, 'tis plain, vaniſhes likewiſe.

2. The Relation of the *Heights* of the *Fluid*, to the Correſpondent *Diameters* of the ſmall Tubes, being expreſs'd by this *Analogy* (for Example) *viz.* $Ma^p : Oh^p :: ON : MK$; then the Relation of the ſaid *Heights of the Fluid*, or the *Ordinates* of the Curve RahcX, to the reſpective *Abſciſſes* BS, BO, &c. will be $Ma^{\frac{1}{p}} : Oh^{\frac{1}{p}} :: AO^{\frac{n}{r}} \times OB^{\frac{1}{r}} : AM^{\frac{n}{r}} \times MB^{\frac{1}{r}}$ (as appears by comparing the two *ſuppos'd* Properties together) and its *Equation* conſequently (putting any Ordinate as $Oh = y$, and the reſt as before) $y^{-\frac{1}{p}} = \overline{a - x}^{\frac{n}{r}} \times x^{\frac{1}{r}}$.

3. 'Tis evident that the Curve RahcX, has its *Ordinates* at the Points A and B, *Interminate* or *Indefinitely great*.

In the laſt written Equation, put $x = 0$; and then $\overline{a-x}^{\frac{n}{r}} \times x^{\frac{1}{r}} = a^{\frac{n}{r}} \times 0 = 0$, and ∴ $\overline{y}^{\frac{1}{p}} = 0$; ∴ $y =$ *Infin.* ſo, put $x = a$, ∴ $\overline{a-x}^{\frac{n}{r}} = 0$, and therefore (as before) $y =$ *Infin.*

So that the Perpendiculars BC and AG, erected at the Points B and A, are *Aſymptotes* to the Curve.

4. And at thoſe Points, the *Fluid* riſes Indefinitely high.

5. And at ſome Point between A and B, we have a *Leaſt* Altitude of the Fluid; to determine which Point, the Equation is $\overline{y}^{\frac{1}{p}} = \overline{a-x}^{\frac{n}{r}} \times x^{\frac{1}{r}}$, or $\overline{y}^{\frac{r}{p}} = \overline{a-x}^{n} \times x$, and (by the Method *de Max. & Min.*) $\overline{a-x}^{n} = \overline{a-x}^{n-1} \times nx$, whence $a-x = nx$; and conſequently, where the *Leaſt* Altitude is, the Line AB is divided in ſuch manner, that the *part* from B thither, is to the *whole* Line, as 1 to $1+n$.

PROP.

PROP. VIII.

Suppoſing as at Prop. III. *the* Heights *of the Fluid, to be* Reciprocally *as the* Diameters *of the ſmall Tubes; I ſay that the Fluid will riſe in a* Strait *Line, between the nearly contiguous Surfaces of an* Hyperbolical *Priſmoid, whoſe* Baſis *is part of the* Exterior Apollonian *Hyperbola.*

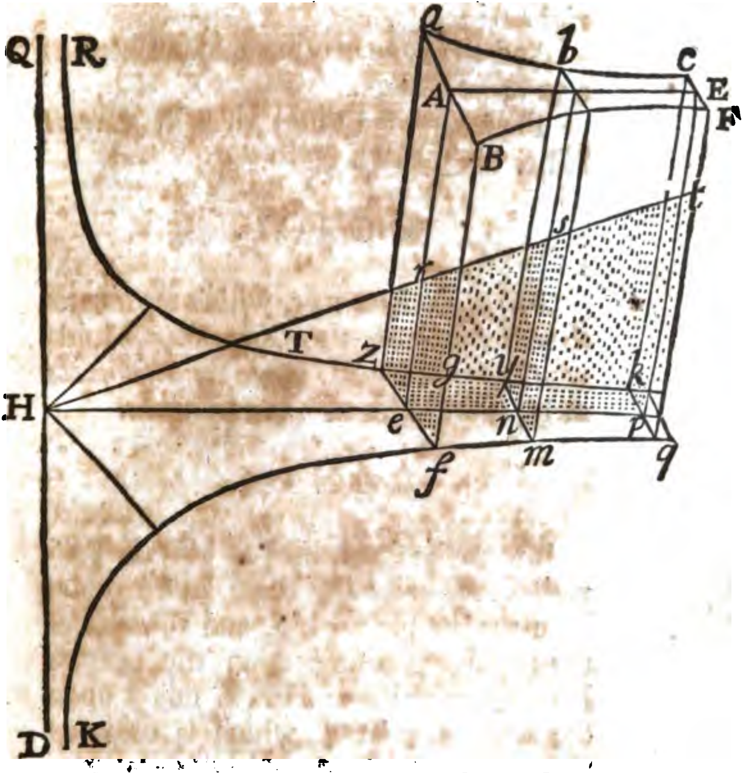
LEt (Fig. 5.) ABEFefGL be a Segment of an *Hyperbolical Priſmoid*, whoſe Baſis efGL, or ABEF, is part of the *Exterior Hyperbola*, the *Centre* H, *Aſymptotes* HD and HG, *Curve* it ſelf Lq-mfK, &c.

The one of theſe Surfaces, *viz.* AeEG being *Plane*, and the other *Hyperbolically Convex*; 'tis plain the Ordinates ef, nm, pq, &c. parallel to the *Aſymptote* HD, are here, the Diameters of our ſmall Tubes.

Suppoſe the Line *r s t*, to be the Line that the Liquid riſes in.

Be-

FIG. 5.



Becauſe $Hp > Hn$, therefore (from the Nature of the *Hyperbola*) $pq < nm$: therefore the *Liquid*'s *height* at p, *viz.* pt, is $>$ ns, its Height at *n*.

But $pq : nm :: ns : pt$ (by the *Hypotheſis*) and $pq : nm :: Hn : Hp$ (from the *Hyperb.*) Therefore $Hn : Hp : ns : pt$.

Therefore the Points, *s*, *t*, lie in a *right* Line.

And the ſame may be demonſtrated of any other Points.

Therefore the Fluid riſes in a *ſtrait* Line. Q. E. D.

COROL.

The *right Line* x s t, which terminates the *Heights* of the *Aſcending* Fluid, would, if produc'd, meet the *Aſymptote* in H, the *Centre* of the *Hyperbola*.

SCHOL.

It were the ſame thing to take the Priſmatick *Hyperbolical* Solid rais'd upon both the double z f k q, and to conſider the Fluid, as riſing upon the Infinite Perpendicular Plane H A E rais'd upon the Aſymptote H G, which is common to both Hyperbola's, and biſects all the Ordinates z f, y m, &c. As to take only the half Solid (as we have here done) and conſider the Figure of the Fluid on the Plane Surface or Side thereof A e E G.

PROP.

PROP. IX.

In Fig. Prop. V. *If the Curve* L f K, *were ſome ſort of* Hyperboloid, *and not the Common Hyperbola ; then again (making the ſame Hypotheſis as at* Prop. III.) *the* Line *which the Fluid riſes in would be a* Paraboloid, *and not a* Strait *Line.*

SUppoſe $pq : nm :: Hn^r : Hp^r$, Then ſince $pq : nm :: ns : pt$, Alſo $ns : pt :: Hn^r : Hp^r$, and ſo rst is a *Paraboliform* Line, whoſe *Vertex* is alſo at H, the Centre of the *Hyperboloid.*

SCHOL.

We may obſerve *a remarkable Correſpondence*, or *Reciprocation*, between what has been demonſtrated here, and in ſome Propoſitions foregoing.

For *Rectilineal* or *Plane* Surfaces, make the Liquid riſe in the Common *Hyperbola* ; by *Prop.* III.

On the other hand, An *Hyperbolical* Surface, makes it riſe in a *Right Line*; by *Prop.* V.

Again; by *Prop.* IV. If the *Baſis* be any *Paraboliform* Curve, the Liquid ſhall riſe in one of the *Hyperboloids.*

And we find here, by Prop. VI. that when the *Baſis* is one of the *Hyperboloids*, the Fluid ſhall riſe in one of the *Paraboloids.*

This deſerves to be taken notice of.

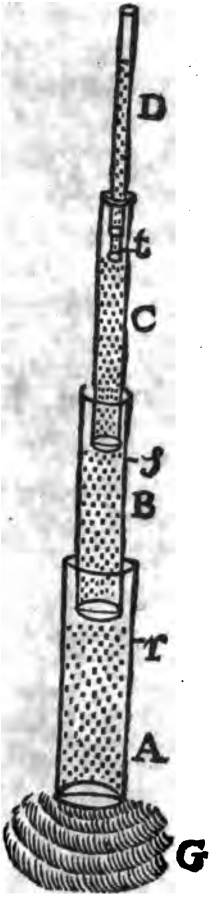
LEMMA I.

If there were ſeveral ſmall Tubes, one leſs than the other, whereof the Leſs, *was continually inſerted into its next* Greater; *I ſay that by ſuch an* Apparatus, *a Liquid may be made to riſe to any aſſigned Height: or in other Words; upon the Immerſion, of the* biggeſt *and* loweſt *Tube into a Liquid, the Liquid may aſcend into the* uppermoſt *and* leaſt *Tube.*

THE ſmall Tubes A, B, C, D, &c. are Inſerted into each other; and the Greateſt and Lowermoſt of all A, is immers'd in ſome Liquid at FG.

Sup-

FIG. 7.



D

Suppoſe the Liquid to riſe up to *r*, in the Tube A.

If the Extremity of the Tube B, reaches to *r*, the Liquid of the Tube A, 'tis plain will riſe in the Cavity of the Tube B.

Let it riſe therein up to *s*.

If the End of the Tube C, reaches to the Mark *s*; then for the ſame Reaſon as before, the Liquid in B, ſhall aſcend into the Tube C, and from thence into the Tube D, and ſo on, the ſame Conditions being ſtill obſerv'd.

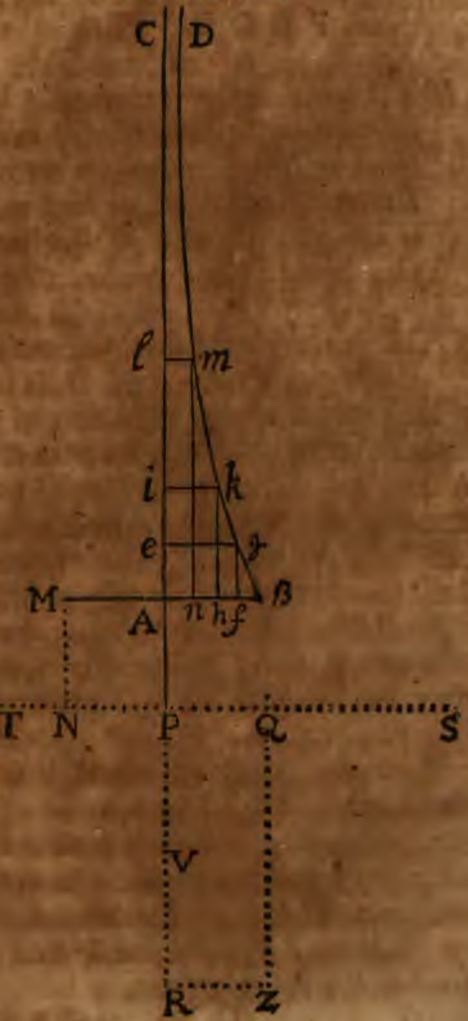
From whence it appears, that by adapting a Series of ſmall Pipes accordingly; the Fluid may be carried to what height one pleaſes above the Surface F G.

LEMMA II.

The Line A C, *Fig.* 8. *being the* Aſymptote *of the Curve* B g k m D, *if the Interminate Curve-Line be turn'd about* A C *as an* Axis, *there will be produc'd by that Converſion, a Superficies, which will conſtitute an* Infinitely *diminiſhing Aſymptotical Pipe.*

PROP.

FIG. 8.



PROP. VII.

If a Liquid begins to aſcend, in an Aſymptotical *Pipe, it muſt continue to do ſo, till it comes to the utmoſt Extremity of it ; or, as long as there is any part of the Pipe left unoccupied by the* Fluid.

FOR 'tis evident, that the entire *Aſymptotick* Cavity ABCD (Fig. 7.) will be exhauſted, by an Infinity of thoſe little *Inſcrib'd Cylindrick* Surfaces Aegf, Aikh, &c. which are produc'd, by the Rotation of the *Inſcrib'd* Rectangles, about the Axis AC. Theſe *Cylindrick* Surfaces, are as evidently a Series of ſmall Pipes, inſerted into one another, the *Leſs* into the *Greater*, and this continually; after the manner as is repreſented at Fig. 6.

Now the Continued Everlaſting Approximation of the *Curve* to its *Aſymptote*, makes *this* Caſe equivalent to *that*; namely a parcel of little Tubes paſſing into one another: only here their *Heights* are taken as Infinitely *ſmall*, and that *Number* as Infinitely *great*.

And therefore (by *Lem.* I.) the Fluid having *once begun to mount upwards, muſt continue to do ſo*, as long as it finds any part of the Tube remaining to be poſſeſs'd by it. So that tho' the Tube be *Indefinitely* produc'd, the Liquid muſt ſtill continue its Motion, and reach the utmoſt Altitude before it ſtops, be it as far as it will. Q. E. D.

COROLL.

From the Given Menſuration of Solids, it may be determin'd, what Quantity of Liquid, any ſuch Aſymptotick Pipe (tho' Infinitely continued) ſhall draw out of a Veſſel into which it is Immers'd.

Ex. gr. If the Curve BgkmD, were part of an Apollonian *Hyperbola*, whoſe Centre P, and Rectangular Aſymptotes CPR, TPS; then if we produce BA to M, ſo that MA = AB, and let fall the $\perp^{rs}$ BQ, MN, to the Aſymptote TS: I ſay the Infinite Tube generated by the Revolution of the Area ABCD, &c. about the Aſymptote CA, *ſhall draw up juſt as much Fluid*, as will fill the Cylinder MQ, whoſe Height is BQ, and the Diameter of its Baſe NQ; and no more.

Which is plain. For *Torricellius* has demonſtrated, that the *entire* Solid, made by the Rotation of the Infinite Figure CAPQBD about the Axis CP, is equal to the Cylinder PZ, whoſe Height is $PQ = AB$, and the Diameter of its Baſis $RP =$ the whole *Tranſverſe* Axis; which Cylinder, is equal to twice the Cylinder MQ. For PR being biſected in V; from the Nature of the *Hyperbola*, $PV^q = 2\,AP \times PQ$; $\therefore PR^q = 8\,AP \times PQ \therefore PR^q \times PQ = 8\,PQ^q \times AP \therefore PR^q \times PQ = 2\,QN^q \times AP \therefore \odot PR \times PQ = 2 \odot QN \times AP$. So that the Infinite Solid generated by the Rotatation of the Area ABCD, is = the Cylinder MQ; and conſequently the Cavity of the Pipe aforeſaid, will contain juſt as much as the Cavity of that Cylinder.

If the Curve were the *Logarithmetick* one, then the Quantity of Fluid ſuck'd up by ſuch a Pipe, would be to that contain'd in the *Hyperbolical* one, as PS to PA; the Line PS being ſuppoſ'd to be the *Subtangent* of the *Logarithmetick* Curve. The like may be done for Tubes form'd by the Rotation of other Curve-line-Figures.

PROP.

PROP. VIII.

All the Phenomena, of the Aſcent of Fluids, between the nearly Contiguous *Surfaces of Bodies; are to be accounted for, from the Principle of* Attraction: *and as far as hitherto appears, from that Principle* only.

FOR (by *Prop.* I.) the Caſe of the Aſcent of Liquors, between the *nearly Contiguous* Surfaces of Bodies, is reducible to that, of the Liquors Aſcending in a Series of *ſmall Tubes*.

Now it may be fairly ſhewn, from *the Law of Attraction*, how the Liquor riſes in ſmall Tubes: For which I refer to the Excellent and Ingenious, the late Mr. *Hawksbee*'s Experiments.

Farther, all other Principles, that *Philoſophers* have hitherto proceeded upon, to explain theſe Phenomena, are demonſtrably Inſufficient for that End.

Neither *Congruity and Incongruity*, nor the *Aſperities* of the Surfaces of Bodies, nor the hinder'd Action of the Air, nor any other *pure Mechanical* Account ever yet propos'd, will fairly do the Buſineſs.

There remains nothing, but the *Attractive Power* of the *nearly contiguous* Surfaces of Bodies, by which it may as eaſily be underſtood how a Fluid may be rais'd between thoſe Surfaces, as 'tis hard to be conceiv'd without it. But ſee more of this, in the following Corollary.

A General COROLLARY to the foregoing *Diſcourſe.*

HERE we have an Ocular Demonſtration of the Operation and Influence of that Fam'd *Power in Matter*, concerning which ſo much has been ſaid, and ſo many noble and uſeful Diſcoveries have been made; *Attraction*, I mean; the Grand Principle which holds the whole Corporeal World together.

We behold indeed, in the Motions of the Celeſtial Bodies, ſome Effects of it that may be call'd more Auguſt and Pompous. But methinks theſe little *Hyperbola's*, form'd by a Fluid between two Glaſs Planes, are not a-whit leſs fine and curious, than the ſpacious *Ellipſes* deſcrib'd by the *Planets*, in the bright Expanſe of Heaven.

The *Law of Attraction*, 'tis true, in theſe diminutive Syſtems of Matter, is very different from that which obtains in thoſe Bodies of ſo vaſt Bulk and Magnitude. However 'tis the ſame *Power* or *Principle*, acting both *here* and *there*, tho' in different Circumſtances and Conditions: which *there* produces a beautiful Scene of *one ſort of Curves*, and *here* (according to the various State of things) *another*.

An Effect ſo very certain, and uniform, as this *Aſcent of Fluids in Exact Geometrical Figures*, muſt neceſſarily depend upon ſome Cauſe, which acts *as uniformly*, and after one conſtant Mode or Tenor. There can be nothing of *Irregular Fits and Starts*, nothing of *uncertain precarious Cauſality*; where a Phenomenon is produc'd in all Circumſtances, *ſo conſiſtently with it ſelf*, and *ſo rigorouſly nice and accurate*. One may as well ſuppoſe *any Curious Curve* (where-ever one ſees the Traces of it) to have been form'd by Chance and Diſorder, or drawn by no *certain Law or Rule* at all; as that ſo many elaborate and well-defin'd *Sections of a Cone*, as are here deſcrib'd upon the Surface of a *Glaſs*, are not the Work of ſome fix'd and regular Principle in Nature. If I found a neat Geometrical Figure mark'd out upon the Ground, I could as eaſily imagine the neighbouring little Atoms of *Earth and Sand*, to have accidentally puſh'd and joſtled one another into that Poſture, as that the Particles of a *Fluid*, are rang'd in ſuch Order, as theſe Appearances require, without the Operation of ſome *very ſteddy and uniform Cauſe*. And it will be in vain to ſeek for *this*, amongſt any of the Vulgar Schemes and Hypotheſes of Philoſophers. We ſhall certainly never find it, in *all the Powers of Mechaniſm*, in any *Figure*, *Size*, *Situation*, *Rolling*, *Puſhing*, or *Joſtling* of Particles. The *Interrupted Action and Preſſure of the Air*, *the Efforts of a ſubtile Matter*, the *Innixion* of the Fluid upon the *Pores and Aſperities* of the Glaſs (as ſo many little *Props or Fulciments*, by which we are told it creeps up along the Sides on't) theſe will afford us no Light into the Buſineſs. Something there is, in the Doctrine of *Congruity* and *Incongruity*, when rightly explained: but taken for the *meer Fitneſs or Unfitneſs of Particles* in any *pure Mechanick Senſe*, 'tis both as wrong and as inſufficient for the Purpoſe, as any of the reſt.

That Principle moſt certainly, and that alone, which is ſufficient fairly to account for the *Riſe of Fluids in ſmall Tubes*, is ſufficient to account for this Phenomenon. And it being plain, that nothing but *Attraction* can help us *there*; 'tis as plain that we are to have recourſe to nothing elſe *here*. Nor need we go any further than *this*, to ſeek for a *Cauſe*, that will do all we want, or can require to be done, in this Matter. For as the Principle of *Attraction* will Solve all the Difficulties of the Phenomenon before us, ſo it will do it, without forcing us upon any of *thoſe much greater Difficulties*, or rather *manifeſt* Abſurdities, which all the other Methods, ever ſo handſomely explain'd, will of neceſſity, at laſt terminate in.

I know this Doctrine of *Attraction*, will not go down well, with a great many People; even in *this Age*, wherein 'tis become almoſt Scandalous not to believe it. They have many Objections againſt it, which a Man in good Manners is bound to believe they think to be of conſiderable Strength; while at the ſame time there appears little ground of hope, of their ever being brought to think otherwiſe; becauſe, in ſhort, the proper Materials, for Conviction to work upon, are wanting in the moſt part of thoſe, who doubt in theſe Caſes. They are not us'd to *Natural Speculations*, to make *Obſervations*, to try *Experiments*, to *compare Cauſes and Effects*, to *argue and reaſon upon the Phenomena of the World*; and beſides are deſtitute of all *Mathematical Furniture*, requiſite to make them capable of Forming a right Judgment in Matters of this Nature. Now they may very well allow, without being at all ſevere and hard upon themſelves, that ſuch Diſuſe, or rather abſolute Unacquaintedneſs with Things, may eaſily make a Doctrine, tho' otherwiſe well confirm'd both by *Demonſtration*, and *Matter of Fact* too, appear very ſtrange and uncouth to *them*. A Man who has not uſed himſelf to think and reaſon upon a Subject, ought in Modeſty and common Juſtice to ſuſpect all his Prejudices againſt it; and ſhould call his Doubts in queſtion, tho' they appear ever ſo well grounded to himſelf. For it cannot but be, that intimate Converſation, and Application to a Thing, ſhould much direct and enlighten a Perſon's

Thoughts, and put him into the way of clearing up a World of Difficulties, which Ignorance and Unacquaintedneſs will always put it out of his Power to extricate himſelf from. Remove the Cauſe, and the Effect will ceaſe: Converſe with *Nature*, and Study *Mathematicks*, and you'll eaſily be reconcil'd to the Doctrine of *Attraction*.

But ſay theſe Gentlemen; *How comes it to paſs that this preſent Age is ſo much wiſer, than all the foregoing ones? Is it not ſtrange, that none of all the great and celebrated Genii of Antiquity, ſhould ever light upon this Diſcovery, which is admir'd and cry'd up, as the only Key to all true Philoſophy of Nature?* No indeed, I don't think it is all ſtranger, that they ſhould miſs this, than that they ſhould miſs a thouſand other things, which we are well aſſur'd they have actually overlook'd. Every Age has it proper *ſhare* of Knowledge and Invention; and ſince whatever is found out, muſt be found out in one Age or other, I am not a bit more ſurpriz'd, that the Doctrine of *Attraction* was found out and demonſtrated between Anno *Domini* 1600 and 1700, than I ſhould have been if it had happen'd between 1600 and 1700 Anno *Mundi*. Men's Wits will work, and Truth will out ſome time or other; and I don't think 'tis any Matter of Wonder at all, that it happens in *this* Century rather than *that*. No one Man, or *Age* of Men, will ever find out all that *Providence* ſees fit and uſeful for the World to know; and therefore the Charge of *Improbability* lies no more againſt any Diſcovery of Truth in our Days, than it did in former Times, againſt what our Anceſtors had the good-luck to hit on. Men might have reaſon'd *then* with reſpect to *thoſe who went before them*, upon as good Grounds as we can *now* with regard to *our Predeceſſors*; and if Mankind had always been of this Mind, 'tis moſt certain no Arts and Sciences had ever been receiv'd or cultivated in the World. I would have theſe Gentlemen think, that the moſt *vulgar Piece of Mechaniſm*, was *ſometime or other*, a new Diſcovery, and that even he who firſt found out that moſt uſeful Inſtrument, *a pair of Nutcrackers*, did what all the World had never done before.

Well; but ſay they; *This Doctrine of Attraction*, is every whit as Unintelligible,

ble, as that of the Schools, about *Subſtantial Forms*, and *Occult Qualities:* and if all your boaſted Modern Diſcoveries carry us no farther than this; we had e'en as good keep to *Ariſtotle* and *Thomas Aquinas* ſtill, and let all your *Mathematicks* alone.

Anſw. If nothing were to be true, but what's Intelligible to a great part of theſe Objectors, I doubt Human Knowledge would be comprehended within much narrower Bounds, than now we are ſure it is. And ſince abundance of Things, which to *them*, are *occult* Qualities, are Matters of evident Demonſtration with the reſt of Mankind: 'Tis to be hop'd that the dark and cloudy Appearance of the Doctrine of *Attraction*, to theſe Gentlemen, will not be ſo much an Argument that it is not clear and viſible *in it ſelf*, as that they want the *proper Opticks* to ſee it. This indeed would be a much better and ſounder way of arguing: For a Blind Man does by no means Reaſon fairly, when he concludes the Sun does not ſhine, becauſe Nature has made him incapable of *Ocular* Demonſtration.

Well, but for all this, they urge, That ſtill *Attraction* is no better than an Occult Quality, becauſe we can't tell them *the Natural Cauſe of it.*

But I fancy, a little better Information about the true Notion and Meaning of *Occult Quality*, would do theſe People no harm. For by this term *Occult Quality*, the Philoſophical World do generally underſtand nothing elſe, but *ſome meerly feign'd Suppoſititious Power or Vertue, ſome Property or Affection (of or belonging to Bodies) whoſe Exiſtence is altogether doubtful and uncertain, and which lies involv'd in ſuch Obſcurity, that nothing can be known or determin'd about it.* 'Tis, in a word, a meer Refuge for Ignorance; a Shelter for Unphiloſophical People to hide themſelves in; a *word* to make a Noiſe with, that they may ſeem to ſay *ſomething*, when a total abſolute Unacquaintedneſs with Nature, has made it Impoſſible for them to ſay any thing to the purpoſe. This is the true meaning of *Occult Quality*.

Now I hope we are not to beſtow this hard Name upon every thing that we cannot preſently aſſign a Phyſical *Cauſe* of.

‘ Indeed, in that Caſe, I acknowledge *our own* Philoſophy would ſhrink; but I doubt *that* of our Antagoniſts would lie in as little room, as *Homer*'s *Iliads* are once ſaid to have done. I believe theſe Gentlemen themſelves, as far as their Light goes, have Notions, of ſome *Firſt and Simple Qualities of Bodies*: Otherwiſe, 'tis making a little too bold with Common Senſe and Propriety of Speech, to talk of *Secondary and Compound Qualities*. And if Bodies have any Qualities or Affections at all; they muſt be either *Firſt and Simple*, or *Secondary and Compound*; at leaſt, unleſs theſe Gentlemen can *interpolate*, and throw in a middle Sort; Qualities that ſhall neither be *Primary* nor *Secondary*, *Simple* nor *Compound*. And if they have any Thoughts this way, I ſhould think it moſt adviſable for them to pitch upon *Occult Qualities*; which being *juſt nothing at all*, may fitly be urg'd as a very pat Inſtance of neither *Firſt* nor *Second*, *Simple* nor *Compound*; and ſo may ſeaſonably come in, to help out at a dead lift, in this Caſe, as they have done the ſame Service to other Philoſophers in former Ages.

Now what I would fain know of them, is this: viz. *Whether Simple Qualities are explicable by any proper Phyſical Cauſes or Reaſons, yea or no? Whether thoſe Affections, of Body or Matter, which they themſelves will call* Original *or* Primary; *can, in the Nature of Things, be explain'd and accounted for, this way?* If they anſwer in the *Affirmative:* Then thoſe Qualities are not *Firſt and Simple*; which is contrary to the Hypotheſis, that they are ſo. For no pure *Simple* Affection, is to be deduc'd *à priori*, from other Cauſes and Principles. If they ſay *no:* Then the *Inexplicableneſs* of a Thing by *Phyſical Cauſes*, is juſt as much an Argument againſt *Simple Qualities*, as 'tis againſt *Attraction*; or if it be no Argument one way, 'tis none the other.

So that upon the whole, what theſe Gentlemen have to do; is either, to deny the Exiſtence of *Simple Qualities*, and conſequently of any *deriv'd or compounded* one, and conſequently of *any Quality at all*, and conſequently even of *Bodies themſelves*, which we know not in their *inward Eſſence*, but by their *Qualities and Affections:*

Or elſe, fairly to ſtand to it, that Primary Qualities, *are not Primary Qualities*, nor *Simple* ones *uncompounded*:

Or elſe, to introduce a *Progreſſion* of Simple and Compound, which never ſtops or reſts any-where, but runs on to *Infinity*:

Or Laſtly, to agree with us, That there are, or may be, *ſome Properties or Affections of Body, Really exiſting in the Nature of Things*, which however we may not be able to aſſign the *proper Phyſical Cauſes* of; and conſequently that the idle Name of Occult Quality, is not to be given to this Principle of Attraction, upon the Score of its being *that way* inexplicable.

Here's a fair Field of Choice for them, I think! They may either *ſubvert Philoſophy*, *deny plain Experience* and Matter of Fact, *contradict Common Senſe* and Reaſon, or elſe be of *our Opinion*. What would they have?

It may be, ſome of theſe Gentlemen may ſay, *they don't ſee how theſe things will follow*. But I can't help that; and 'tis enough for me if other People do; 'Tis too hard of all Conſcience to find a Reader with Books, and Underſtanding too: So I'll leave that Matter to themſelves, and go on to conſider, what they have to ſay in the next Place; which is, that *if Attraction be not to be accounted for from Natural Cauſes, then 'tis ſomething Supernatural and Miraculous.*

A terrible Conſequence indeed! If it be not accountable from pure *Natural* Cauſes, it muſt be fetch'd from a *Supernatural* one: if it be not from one, it muſt be from the other. And what mighty Harm or Danger is there in allowing it to be ſo; or what Sort of Inference would theſe People draw from it? Indeed in a Scheme of Inſipid *Atheiſtical* Philoſophy, we can expect to hear of nothing but Pure Nature, and Natural Cauſes. As the whole Corporeal Machine is *of it ſelf*, by abſolute Eternal Neceſſity of Nature, ſo *every Motion and Diſpoſition of the Parts of Matter* therein, is the Reſult of the like neceſſary Action and Influence of Bodies upon one another. But all the thinking, the *really* Philoſophical Part of Mankind, know that this is Infinitely fooliſh and abſurd; and that Matter is not under its own Laws, nor mov'd by *meer fatal Mechanical Neceſſity*, but at the Will and Pleaſure of *a Supreme Governing Mind*, who created, and continually preſides *over the whole Corporeal Univerſe*, and diſpoſes all Things therein by ſuch wiſe Laws, as he at firſt ſaw neceſſary to be Eſtabliſh'd, in a World *ſo order'd and contriv'd*.

So that, to run Things up to their true Original, every thing we ſee is *Supernatural*; that is, above the pure Energy and Laws of Matter; in that all Agents throughout the whole Syſtem, work by the Vertue, and according to the Laws, preſcrib'd them by the Great Creator, and produce their Effects in ſuch Order and Manner, as reſults from that exact and curious Adjuſtment of them one to another, which he at firſt contriv'd.

Now to ſpeak juſtly and truly in the Matter, a *Natural* Effect, or an Effect accountable for, in a proper *Phyſical* way; is when we can evidently *trace the Actions of Bodies from one to another, or diſcover the Agency of one part of the Machine upon another, which has ſome relation to, or dependance upon it.*

And that's a *Supernatural* Effect (either *as to us*, or *ſtrictly and properly* ſo in it ſelf) when either we cannot diſcover *this Connexion* in the Order of Material Cauſes and Effects, ſo as to *trace the Cauſality* from one Quarter to another; or elſe, when any Action, Motion or Operation of Bodies, is really not the Reſult of any proper Influence or Agency of them upon one another, in the ordinary Way of Communication; but *of ſome Power or Vertue more immediately impreſs'd on them by the Will of the Creator, without the Intervention of any Subordinate Material Cauſe.*

Now then, ſince all the Powers and Affections of Matter, *ſince all the Operations aud Motions of Bodies whatſoever, in this great Frame of things, muſt ultimately be reſolv'd into the Will of God*; ſince every Action of the Particles of Matter, at the fartheſt Remove in the great Chain of Cauſes and Effects, is but the Motion firſt communicated from HIM, and propagated by ſome Intermediate *Under-movers:* The Queſtion is, Why ſhould any Man be ſtartled at a *Supernatural* Cauſe? Is it a Treſpaſs againſt the Rules of any Good Philoſophy, to own the Being of a *God*, or his Super-intendency in the World of *Matter?* Let us run things as high as we will; here it is, that we muſt ſtop at laſt. If I allow an *Infinite Intelligent Being*, for a Firſt Cauſe or Mover, in the vaſt Syſtem of Matter, or Series of Bodies ever ſo far continued; tho' I can plainly deduce an Effect, in any part of the Series, from its next Immediate Cauſe, and ſo trace it up from thence, to Superior Agents and Movers in the Chain; yet the Final Reſult of all theſe Deductions, will be, my reſting in ſome Quarter of the Syſtem, where the Influence is *Immediate* from the *Supreme Agent*, and not communicated by any Secondary or *Subordinate* ones.

And therefore, if this Phenomenon, we are ſpeaking of (I mean *Attraction*) be of ſuch a Nature, that it is abſolutely inexplicable in *any pure Mechanical way*, or by any Sort of Impulſe or Motion communicated from one Body to another, in the ordinary and ſtated way of Bodies acting here in the Corporeal World; then we muſt, whether we will or no, reſolve it, into the Proper and Immediate Influence of the *Great Author of Nature himſelf*, and acknowledge it to be *a Law impreſs'd on Matter by his Divine Will and Power*, and not *reſulting* *from any deriv'd inferior Cauſality or Agency, of Matter upon Matter*; how fit ſoever we may vainly fancy, any Portions or Syſtems of it to be, for the Production, or Continuation of ſuch a Phenomenon in the World.

And therefore now, at once to put a full End to this Objection, which comes arm'd with the terrible Word *Supernatural*; as if that were enough to deſtroy all the Credit of this Doctrine: I will deſire theſe Gentlemen to conſider but theſe two or three Things.

Firſt, That amongſt all Men, who in their Schemes of Philoſophy, place A GOD at the Head of the Corporeal Univerſe; it can never poſſibly be reckon'd at all *Unphiloſophical*, to ſuppoſe, that ſome Phenomenon in or belonging to Matter, may not ariſe from, or may be produc'd without, the proper Action of *other* Matter or Body. For it can never be a Treſpaſs upon Philoſophy, to allow what's true in Nature and Fact. And ſince thoſe Perſons, who don't ſuppoſe *an Infinite Progreſſion* of Material Cauſes and Agents, but ſtop at an *Eternal*

nal Mind, who was the Beginner of all; allow in Fact, ſome Impreſſions on Matter, which are not derived from any Antecedent Action of Matter: 'Tis plain, that by their own Principles they are tied up, from ever urging the *Unphiloſophicalneſs*, of ſuch a Notion as this, when introduced upon any other Occaſion. Therefore we muſt hear nothing of *that Topick*, from thoſe who do not pretend to be *Atheiſts*.

Secondly, I deſire them to conſider farther, That *Attraction*, *Gravitation*, *Centripetency* (or call it by what Name you pleaſe) I mean that Power in or belonging to Matter, by which all its Parts and Syſtems, whether *Greater* or *Leſs*, whether in the *Celeſtial* or *Sublunary* Regions, do tend to one another; that this Power (I ſay) is not to be accounted for, by any pure Mechanical Hypotheſis.

In order to convince themſelves that this is true, theſe Gentlemen would do well to look into ſome of the Modern *Mechanical Philoſophers*, and ſee what rare Work they have made, with their Attempts at Solving *Gravity*, by Matter and Motion. In ſhort, there's none of all their *Hypotheſes*, that can ſtand the Teſt of a ſtrict Examination; nor do ſome indeed require it, diſcovering themſelves almoſt at firſt ſight, barefac'd Contradictions to plain Fact and Experience. And tho' in ſuch Caſes, where Things depend purely upon a Stretch of Human Sagacity and Invention, it is impoſſible for any Man to ſay with any Warrant, what will or will not be diſcovered; yet in Caſes where the Eſtabliſhed Laws and Nature of Things, plainly *ſtand in the way and forbid*, it's no Preſumption at all to ſay deciſively, that ſuch or ſuch a thing, will never be Solv'd by ſuch or ſuch Principles. And this, theſe Gentlemen will find upon a thorough Scrutiny into the Matter, to be the very Caſe here. There is nothing in *Matter and Motion*, to Solve this Phenomenon of Attraction; and therefore it will never be Solv'd by *Matter and Motion*.

Laſtly, If theſe Gentlemen will exclude Attraction from their Philoſophy, upon this Pretence, that 'tis ſomething *Supernatural*; they muſt exclude all *Firſt and Simple Qualities* upon the ſame

Score. And how fine and uſeful a Syſtem of Philoſophy that muſt be, which throws out all Qualities, (for if no *Simple* or *Primary* ones, no *Compound* or *Secondary* ones, and ſo none at all.) I believe I may leave it *even to themſelves*, to judge. So that I hope upon more mature Thoughts they'll find it adviſable, to drop the *preſent* Objection.

But they'll query again perhaps, and ask, *What we make of this Attraction, what ſort of Power we reckon it to be; whether Innate and of the very Eſſence or Conſtitution of Matter, or ſomething extrinſick and adventitious to it?*

Anſw. Suppoſe we can't tell which 'tis, it ſignifies not a Ruſh; as long as we are certain of the Matter of *Fact*: ſo that this is no Argument one way or other. However for a more direct Anſwer: It appears upon all accounts moſt reaſonable to conclude, that it is *a Power extrinſick to the Eſſence of Matter as ſuch, and ſuperadded to or impreſs'd thereon, by the Will of the Omnipotent Creator, for the Conſervation and Good of the Univerſe.* We ought to diſtinguiſh between Matter *barely or abſtractedly* conſider'd, and a *Syſtem* of Matter: between Body *as ſuch*; and Bodies *as Parts of the World*; or as plac'd *in a mutual relation* to each other. *Attraction* is not Eſſential to Matter *abſtractedly* conſider'd, but it is, to the *Good Order and Conſervation of a Syſtem*; or to Bodies conſider'd as *Parts of the Univerſe*, and plac'd in various reſpects to, and dependances on, each other.

For *the Infinitely wiſe Author of Nature*, having adjuſted all the proper Requiſites, of a Syſtem *ſo fram'd*, as he thought it fit *this* ſhould be, wherein Bodies ſhould be endow'd with ſuch *varieties of Motions*, and be ſo many ways render'd *uſeful and ſubſervient to one another*: **It ſeem'd Neceſſary, that ſuch a Law or Principle ſhould be Eſtabliſh'd in the Corporeal Univerſe, by vertue of which, all the parts of it ſhould have a** conſtant Endeavour **or Tendency to each other; ſince by this means, they would always be preſerv'd, in that excellent Order and Relation to each other, which he thought moſt beneficial, and therefore at firſt ſo wiſely determin'd.**

And indeed 'tis moſt demonſtrable; that without ſuch a Principle, *the whole World would be unhing'd*, and all the beautiful Syſtems that compoſe it, entirely diſſolv'd. The Celeſtial Bodies would all forſake their Orbits, and fly off into the Immenſe Spaces of the Univerſe; ſhivering one another into Atoms, by the prodigious Force of their mutual Shocks and Colliſions, and ſo reduce all into a perfect *Chaos* again. This would be the certain Conſequence, of the Abſence or Suſpenſion of *this Principle*, even but for a Moment; ſuppoſing ſuch *Rectilineal Impulſes*, as are actually given to the Heavenly Bodies.

But the Almighty Creator, *continually exerts his Power, in cauſing this Univerſal Tendency, of all the Parts and Syſtems of Matter, towards one another*; by which, all the Globes of Heaven (both great and ſmall) are held revolving in their ſeveral Courſes, and have their Parts firmly bound together, to prevent a *Total Diſſipation*, while (for ſeveral Noble Ends and Purpoſes) they are ſwiftly *turning about their own Axes*. So that theſe Gentlemen may call *Attraction*, an *Occult* Quality, or what elſe they pleaſe; but 'tis evidently a Quality ſo neceſſary, for the Preſervation of the World, that without it we ſhould quickly loſe, both *Order*, *Beauty*, and *Preſent Being* it ſelf. However I believe that in one reſpect, they may ſpeak very properly, when they call it an Occult Quality; and that is, becauſe it is *hidden* from them.

I ſhall not after all this, put my ſelf to the trouble of ſtudying for any more of theſe Gentlemen's Objections, after I have let them ſay this one thing more.

But pray what Proofs have you, that all this is true in Fact? What Inſtances can you give to ſhew, that it really is ſo? Where ſhall we ſee any manifeſt Signs or Effects, of this Attraction, you talk of, in Nature? For without this, 'tis all but meer Fiction and Hypotheſis.

Anſw. There are Inſtances enough to be produc'd; but the Queſtion is, Whether thoſe Gentlemen are qualified to judge of them. They know, that for a Man to perceive the true Force of an Argument in any Science, 'tis requiſite he ſhould have ſome ſhare of Knowledge, and Acquaintance with the Subject talk'd of: otherwiſe the brighteſt Demonſtration is loſt, and the plaineſt Proof is no Proof at all. I ſuppoſe they'll eaſily allow, that a Man quite void of *Letters* would be no proper Judge of deep Speculations in *Antiquity* or *Theology*: or that the Deciſions of a Bench of grave *Divines* and *Lawyers*, would be never the more queſtionable, becauſe an *Ignoramus* that ſtood by, and heard them quote *Fathers* and *Codes* upon the occaſion, thought all that was ſaid to be meer Gibberiſh and Nonſenſe, and the Speakers themſelves to be out of their Wits. Would any of theſe Gentlemen value a Man's Opinion in *Anatomy*, that did not know whether the *Heart* or the *Brains* lay uppermoſt? Or think him fit for a Director of *Chymical* Operations, that could not diſtinguiſh between a *Crucible* and a *Gally-Pot*? There's ſomething requir'd, to make a Man a competent Judge of Matters that lie before him; and 'tis not enough to come freſh and crude to a Subject, and then fall immediately upon it, determining what's right, and what not.

And therefore theſe Gentlemen will do well to remember, that ſeveral Phenomena in Nature, *may* certainly infer the Being of ſuch a Power in Matter, as we call Attraction ; *tho' they don't ſee how :* and that in concluding the contrary, they have no more Right or Reaſon on their Side, than all People in general have, who diſbelieve whatever they don't themſelves underſtand ; of which they know, there are great Numbers in the World.

In hopes of this fair and candid Management on their Side ; I'll briefly hint ſome Phenomena to them, which are plain ſenſible Inſtances of *the General Power of Attraction* ; and after all the utmoſt Endeavours and Attempts of the *Corporealiſts*, will for ever remain inſolvable any other way.

Let them conſider therefore ——

The Retention and Revolution of the Heavenly Bodies (Comets and Planets, both Primary and Secondary) *in their ſeveral Orbits, thrown out with ſuch Prodigious Forces as they are, in the Directions of Tangents :* with the ſimple abſolute Impoſſibility in Nature, of a Bodies ever deſcribing any *Curve-line*, without being held and directed by ſome Power, which is Eternally drawing it out of a *Rectilineal Path.*

—*The Common Phenomena of the Deſcent and Gravitation of Heavy Bodies here upon our Earth; their Weights decreaſing both upwards and downwards from the Surface, where it is the greateſt of all; and being in Bodies of all Varieties of Forms and Textures, ſtill exactly proportional to the Quantity of Matter which they contain.*

—— *The known and conſtant Phenomena of the Tides, or Flux and Reflux of the Sea, which in all Parts of the Globe, and at all Seaſons of the Year, do ſo nicely anſwer to the Attractive Forces of the Moon and Sun.*

—— *The Refractions, Reflections and Incurvations of the Rays of Light, as paſſing through, falling on, or approaching to, the Edges and Surfaces of Bodies; in ſome of which Caſes, by the wonderful Bending and Turning of them in that Paſſage, a Man has even Ocular Demonſtration of the Action of ſuch a Power.*

—— And laſtly, to name no more: *The ſtrong Coheſion of the Parts of Matter in Solid Bodies; which can never poſſibly be effected, by the meer* Reſt *of the Particles, or their fit* Adjuſtment *and Appoſition to each other in reſpect of Shape and Situation; but requires a Principle of quite another Nature and Original; which acting variouſly in different Sorts, and States of Matter, according to the different Requirements of the World, and the wiſe Appointment of the Author of it; ſhould produce us Solid Bodies of all Degrees of Conſiſtency, hard and ſoft, firm and looſe, denſe and rare, rigid and flexible:* And ſuch a Principle is that, *by which the Parts of Matter are drawn to one another*; nor do I make any Scruple to ſay, that this alone will fairly account for their Coheſion into Solids.

If any of theſe Gentlemen ſay after all, *they are never the wiſer for this*; I ſay, I believe ſo too: and that my Reaſon for ſuggeſting theſe few Things, was not ſo much the hope of convincing People, who are not qualified for Conviction, (*for 'tis ſuch only that I intend in this Diſcourſe,*) as to ſhew, that they have no manner of Notion what they mean themſelves by their own Objections againſt this Doctrine. To have offer'd theſe things to *them*, with any other View, had been to proſtitute them: but to do it with this deſign, may, I hope, be no real undervaluing of the Worth of them; and may poſſibly do others ſome good, at the ſame time that it does theſe Gentlemen no harm.

Mat-

Matter not a Cogitative Subſtance:

OR,

The TRUE STATE of the CASE

ABOUT

Matter's Thinking:

WITH SOME

CONSIDERATIONS and REFLECTIONS thereon,

TENDING

To the Compleat Settling of that Point.

By HUMPHRY DITTON.

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The True State of the Caſe about Matter's Thinking.

SECT. I.

TO look over this Controverſy, as managed by the *Deiſts*, within the Compaſs of a few Years, gives a Man a ſort of Image of the Arts of *Defence in War*; where an Enemy retires by degrees from *Outwork* to *Outwork*, and is no ſooner diſlodg'd from one *Poſt*, but he takes ſhelter in another.

Our Incredulous People have acted with much ſuch Sort of *Military Prudence*, in the Maintaining their Grand Hypotheſis, about *Matter's being a Thinking Subſtance.*

They took care at firſt to fortify it after ſuch a manner, *that all ſhould not* *ſink and be loſt at once*; but that whenever, by ſuperior Reaſon and Argument, they ſhould happen to be beat out of *one Part of their Scheme*, there ſhould be *another*, like *a new Work*, ready to retreat to; from whence the Diſpute might ſtill be carried on.

I hope it may not be loſt Labour, to preſent the Curious and Inquiſitive Reader, with a little Draught or Plan, of theſe Sort of *Works*; not only becauſe it may perhaps be grateful and entertaining to his Curioſity, but alſo really uſeful and ſerviceable to him: in that, he may hereby ſee, *what Strength our Adverſaries are of, what clever Proviſion they have made for their own Security, and what admirable Maſters of Deſign they are.* By ſuch Information as this, a Man will the better know how to deal with them.

The Firſt Lodgment of all, which they made, was in the KNOWN PROPERTIES and POWERS of Matter.

And here they thought themſelves not a little ſecure, and made their Defence with a deal of Obſtinacy for a great while; pretending even to *deride* all Attempts againſt them, as abſolutely impertinent and ridiculous.

They ſet themſelves out as the only Philoſophers, that knew how to account, in a neat and clean way, for all the perplex'd Phenomena of the Human Mind, and that had deliver'd the World from that Intollerable Cant and Jargon, about *Spirit and Immaterial Subſtance*, which the blind Bigotted People that believe *Scripture and Divine Revelation*, had, to the eternal Scandal of all good Senſe and Reaſon, ſo abſurdly introduc'd.

They repreſented all the Talk of *Thinking Subſtance diſtinct from Matter*, as the very worſt of *Gibberiſh*; far worſe than what any *Heathen* Writer, and as bad as ever any *Popiſh Schoolman*, the deepeſt plung'd in Metaphyſick Trumpery, had ever offer'd to impoſe upon Mankind.

And accordingly they exploded it, with all the Warmth and Spleen, which might reaſonably be expected from Men, who had previouſly reſolv'd this Doctrine *ſhould not be true*, and knew themſelves undone if it were.

Well: here they firſt ſeated themſelves; and here, I ſay, they made an obſtinate and vigorous Defence.

However upon the Score of *Accidents*; and a Poſſible Neceſſity of quitting *this Hold*, which ſome unlucky and unforeſeen Stroke might one time or other lay them under; they wiſely concluded, in a Caſe of great Diſtreſs, to retreat from hence to a much more Impregnable Piece of Defence, the UNKNOWN PROPERTIES and POWERS *of Matter.*

And here indeed one would think, that theſe Gentlemen might, if any where, well expect to be out of the reach of all annoyance. For who can ſtrike an Enemy, that has entrench'd himſelf in the *Clouds?* Who has Skill enough to attack a *Work*, that is abſolutely UNKNOWN.

As long as a Man keeps upon the *Surface*, he is to be come at, and there is ſome room for a Trial of Skill. But when he mounts up I know not where, and takes ſhelter in Refuges that are altogether *Inviſible and Unknowable*; he is ſafe enough as to any Attempts that can be made upon him. He may ſit there in

Peace, and crow over his deluded Adverſaries, who will never be able to diſturb his *brave* Triumphs, tho' they may vent their Impotent Spleen by Raillery and Reflections, and call him *Coward* for ſo ignominious a Retreat.

But what ſignifies all this, when a Man's got out of Danger? *Cenſures*, tho' ever ſo ſharp and pointed, won't work thro' Stone-Walls, nor make him uneaſy, whoſe only Aim and Buſineſs it is *to be ſafe*. Beſides, *Stratagems* are allow'd in War, and 'tis a piece of *Policy* practis'd all the World over, for People, by any Shifts, tho' ever ſo hard, to provide for their own Security. Who would not blunder and muddle his Adverſary, and leave him to make his Purſuit in the *Dark*, if he could? The Creatures *below* us, are endow'd with *Art and Sagacity* for this purpoſe; and do with wonderful *Prudence* hide themſelves from Animals that are noxious to them. Thus Nature has taught the *Scuttle-Fiſh* to ſecure her Retreat in a time of Danger, by diſcharging her *Native Ink*, and caſting a black Vail over the Face of the Waters: A noble Parallel to the *preſent Caſe!* And therefore, I ſay, that whatever

ever be to be ſaid upon other Accounts, yet that in point of Art and Deſign, *theſe Gentlemen* have done admirably well, in ſhrowding themſelves under the Protection of the UNKNOWN Properties of Matter. For this is being where no body can find you, and that I think is being ſafe.

And now who would have thought there ſhould have been occaſion for any farther Refuge after this? Who would have ſuſpected that one ſo ſecure; ſhould not have been judg'd ſufficient to Weather the Point againſt all Extremities?

But notwithſtanding, to make all ſurer ſtill, it was thought adviſable to add one Work more, and one too that ſhould appear with ſuch *an awful Front*, as ſhould at firſt Sight daſh the Courage of the boldeſt Enterprizer in this Diſpute.

This was *a Pretence of the ABSOLUTE POWER OF ALMIGHTY GOD, to endow Syſtems of Matter, with the FACULTIES OF THINKING and WILLING.*

A Stretch of conſummate Fancy and Invention! For tho' ſome People might think it a little *Unphiloſophical* for Men to lay the whole Streſs of a Diſpute upon on what's Abſolutely UNKNOWN, both to themſelves, and to their Adverſaries, and to all Mankind beſides; To go to Solve plain and obvious *Phenomena*, by *Principles*, which no body could ever be ſure of, and every body muſt neceſſarily doubt of; Tho' this, I ſay, might appear ſomething awkward and odd: Yet no body could ever pretend to diſpute *the Abſolute and Almighty Power of the Creator of the World*: No body would call the Effects of *Omnipotency* into queſtion, or dare to diſown, what was *Poſſible*, to be brought to paſs thereby, (not even thoſe People, who would boggle at *the ſtrange Powers of Matter, ſaid to lie conceal'd in the dark and myſterious Boſom of its Eſſence.*)

And therefore to alledge *God's Power* in the Caſe, was plainly to challenge People upon their *Piety*, not to meddle with the Hypotheſis, and to turn *Religion* it ſelf into a ſort of a *Barricado* to it. 'Twas *over-awing* Men from attempting to diſpute what appear'd under ſo *Sacred a Guard*, and making it even *a Point of Conſcience* to have nothing to ſay againſt it. So that this ſeem'd to be doing all that could ever be neceſſary, ever deſir'd, or ever hop'd to be done.

And indeed here we have all the *Grand Machinations* the Hypotheſis has been fortified with. 'Twould be too tireſome to the Reader, to ſhew him every *Minute Contrivance*, every little Artifice, whether *above* or *under-ground*, that has been made uſe of to prop and ſupport it.

I'll therefore only mention *one more*, which (for the Streſs ſome lay upon it) ought not to be altogether overlook'd; and ſo conclude the preſent *Survey*.

This is a Suggeſtion, *That no Contradiction reſults from our joyning the Ideas of Matter, and its Properties, with that of Thinking Subſtance*: *Therefore* (ſay they) *Matter may be Thinking Subſtance*. Becauſe whatever involves no Contradiction, no intrinſical Repugnancy in the Nature of Things, *may poſſibly be*. And conſequently, if no ſuch Contradiction reſults from the Conjunction of the Ideas of Matter and Thinking Subſtance, or of their *Properties* with one another; then there *may be* an Agreement or Conſiſtency between them, and ſo Matter *may be* Thinking Subſtance.

SECT. II.

AND thus now we have taken a ſhort View of the Strength on *one* Side. Let us in the next Place ſee, in what Poſture things lie on the *other*; what Attempts have been ſet a Foot, what Ground has been gotten, what Progreſs made towards the Subverſion of *this Hypotheſis*; *about which as its main Centre*, I make no Scruple to ſay, *the whole Syſtem of Modern Infidelity does turn.* And that the True State and Condition of the Controverſy may clearly appear, I ſhall take each of the foregoing Heads diſtinctly and ſeparately into Conſideration. I have indeed argued upon the three Firſt already, in *another place*; but I ſhall repeat nothing here, that I have ſaid there: but the 4th is what I ſhall conſider *de novo* here.

SECT. III.

FIrſt then, as for the KNOWN *Properties of Matter:* I am apt to believe, theſe Gentlemen may begin to ſee, there is no Good at all, ever to be done this way. That is, in ſhort, that *Underſtanding or Thought*, cannot be the pure

Reſult of any thing that is to be call'd by the Name of *Mechaniſm.* I don't ſay only, that it can't be *accounted for*, or *ſolv'd* by thoſe Principles; for there are a Thouſand things that we can't account for the particular *Way* or *Modus* of, which yet are certainly true and real in the Nature of Things, and might be deduc'd from ſuch and ſuch Principles, if we had Comprehenſion enough to manage the *Inveſtigation*, and ſhew how the Deduction was to be made. But I lay the Streſs of the Argument upon the utter *Impoſſibility of the Thing in Nature*, by all the Known Properties and Affections of Matter, conſidering the LAWS Matter is evidently ſubjected to, in this Corporeal Univerſe. If there were not *ſome certain Eſtabliſh'd Principles, which forbad the Production of ſuch a Phenomenon as Thought this way*, I ſhould not think it juſt, to reaſon from the *meer unaccountableneſs* of it: But ſince I aſſert, there are ſome *Known Laws* of Matter, that ſtand in the way; the *Deiſts* muſt not inſiſt upon that other Article, but lay the Streſs of the Point where I do, and conſider whether the Thing be *Phyſically Impoſſible*, or not.

Now in order to bring this Debate to as ſhort an Iſſue as may be; I propoſe to them, as follows.

If they can ſhew by clear and ſolid Reaſoning, either ——— ———

That in Acts of ARGUMENTATION and VOLITION, there are not neceſſarily required, NEW STATES or MODIFICATIONS of Matter and Motion:

Or, That thoſe *various States or Modifications*, may be cauſed and introduc'd, without either running upon AN INFINITE PROGRESSION OF MOVERS, or making Matter A SELF-MOVING SUBSTANCE:

Or laſtly; *That there is no Abſurdity in running upon either of theſe Hypotheſes, viz.* That THERE MAY BE AN INFINITE PROGRESSION OF MOVERS, or that MATTER IS A SELF-MOVING SUBSTANCE:

If they can make out *either* of theſe Points, in ſuch manner, that the Learned World ſhall allow the Proof to be Juſt and Good: For my own part, I declare that I'll quit all farther Pretenſions to diſpute this Point with them, and ſubſcribe to the Scheme of *Matter and Motion*, as a Piece of true and ſolid Philoſophy.

But if it be Impoſſible ever to do this; if in a Pure Syſtem of Mechaniſm, *Different or variouſly repeated Acts of Argumentation, will, in the Nature of Things, require really Different States of Matter and Motion; and if that can't be, without running upon one or both of the forementiond Conſequences; and if thoſe Conſequences are Infinitely Falſe and Abſurd:* Then I think they muſt e'en give up the Firſt Part of the Hypotheſis, and fairly yield this Point to us, That Matter cannot think, by vertue of any of its KNOWN Properties and Affections.

I think this Propoſal is fair enough; and, in ſhort, if theſe Gentlemen are thoſe ſincere Lovers of Truth, which they *affect* to make the World believe they are; I can't imagine what ſhould hinder them from bringing this Matter to the cloſeſt and ſevereſt Examination; that ſo *one* Article of Diſpute at leaſt, be fully ſettled betwixt us. I ſpeak this the rather, becauſe ſome of theſe Gentlemen lay their Claims to *Philoſophy*, and ſo are to be eſteem'd competent Judges, whether I put the Controverſy upon the Right Foot or no. If I have given them any Handle, they'll diſcover it, and take hold of it: If I have made an *inſolvable Difficulty*, of any Point that they can handſomly *clear*, or an *Impoſſibility*, where they can demonſtrate it to be otherwiſe; they'll at once give me a compleat Anſwer, and bring themſelves off the Diſpute with Flying Colours. And when the Way lies thus plain and open before them to bring Matters to an Iſſue, if they will neither do that, nor give Reaſons for their not doing it; they may make what fine Flouriſhes they pleaſe about their *Sincerity and Freedom from Prejudice*; but I declare, I ſhall as ſoon take them for *Chriſtians*, as for *Lovers of Truth*: and I believe abundance of People ſee ſo far into the Buſineſs, as to be in no more danger of taking them, either for *one* or the *other*, than I am.

SECT. IV.

IN the *next place*, as for the Hypotheſis *of UNKNOWN Properties in Matter, by which* (we are told) *it may Think and Will*; the great Buſineſs lies here: Not upon the Score of any *real Difficulty* in the Caſe, but the *Trick* and the *Artifice* of it. For all the World ſees, that 'tis nothing but an Evaſion, a Contrivance to get quit of an Argument, which would admit of no other Anſwer but *running away from it.*

And therefore 'tis very hard upon *Us*, that we ſhould be forc'd to argue againſt the *meer little Shifts and Policies* of our Adverſaries; and take pains to confute an Hypotheſis, which they themſelves believe no more than we do. However, ſince this happens to be our Lot, we'll turn it to our own Advantage as much as we can; and as they fancy they have made us a deal of perplex'd Work, by ſtarting this arbitrary Hypotheſis to us; ſo we'll try, whether we can't make them *a great deal more*, by our Reflections upon it.

I am ſo ſanguine as to tell my ſelf, that this Trick, of *Thinking by the Unknown Properties of Matter*, will not only do them no Service, but alſo *turn to a very great Inconvenience*; in that it ſerves to lead them into a Labyrinth, which I can more eaſily ſuppoſe they would be glad to get out of, than I can fancy (at preſent) how they'll be able to do it.

In a word, I ſhall demonſtrate theſe two Things, in the general, concerning this Hypotheſis.

Firſt, *That is it what the Deiſts, if they obſerv'd the ſtrict Laws of Reaſoning, ought not ever to mention, or make any words about:* They ſhould not ſo much as let us *hear* of this Surmiſe, about the *Unknown Properties* of Matter, by which it may be able to *Think* and *Will*.

Secondly, *That it lays them open to all the Inconveniences, to all the bad and ungrateful Conſequences, which 'twas their very Deſign and Purpoſe to avoid, by ſtarting of this Notion.*

And

And I hope theſe two Points, well clear'd, will amount to a Demonſtration, *That they do worſe than ſay nothing,* when they talk after this rate.

In order to the Firſt of theſe, I premiſe as follows.

First, *Two Suppoſitions equally unſupported by any Indications from Nature and Fact, are of equal Force and Authority.*

Secondly, *The Reſult of Two* Contrary *Suppoſitions, of* Equal *Validity and Authority, is juſt nothing at all.*

For they deſtroy one another; and the Reſult amounts to juſt the ſame, as that of *Negatives* and *Poſitives*, of *equal* Quantity or Value, in *Algebra.*

PROPOSITION,

The Deiſt's Hypotheſis, of UNKNOWN Properties, is of no Conſideration at all, in the Controverſy, about Matter's Thinking.

FOR with all the ſame Right and Reaſon, that *they* make a Suppoſition of *Unknown* Properties, by which Matter *may think*; Thoſe on the other ſide, may ſuppoſe *Unknown* Properties in Matter, by virtue of which, it ſhould be *Impoſſible* for Matter to think: Properties, that may as much *forbid* and *unqualify*; as 'tis ſuppos'd that the *others*, do qualify and diſpoſe it, to Thought. And the Reaſon is evident; becauſe 'tis on one ſide *a meer Hypotheſis*; and ſo 'tis on the other. *They* know not, whether Matter has *other* Properties beſides what are commonly known; and ſuppoſing there were ſuch, they know not whether they are of *ſuch a Nature*, as to make Matter a Thinking Subſtance, or no: But they'll *ſuppoſe*, that there are Unknown Properties, by which it may think. Why now on the other hand; we acknowledge we cannot ſearch into the inward Eſſence of Matter, it may have Properties we know nothing of, *and we'll ſuppoſe it may have ſuch Properties as may render it impoſſible for ſuch a Subſtance to think.* But neither *we* nor *they*, know any thing of the Buſineſs, but only *ſuppoſe* on both ſides; that is, we ſay what we think fit, having no *deciſive* Proof or *Experiment* on either ſide, to bear us out in what we ſay. Neither *We* nor *They*, can ever offer to pretend, to any ſort of Warrant from Obſervations in Nature, for what we ſuppoſe on either ſide.

Now I ſay, here's a Couple of Hypotheſes, meer arbitrary Hypotheſes, diametrically oppoſite to one another; Both aſſerted with the ſame Right and Reaſon, Both equally deſtitute of all Authority, becauſe equally unſupported by Matter of Fact and Experience, and therefore of equal Value and Credit. And pray what's the Reſult of all this, in the *Account of Argument and Truth?* Juſt nothing at all, *by the Two foregoing Lemmata.* It comes to no more than this; Do you make *your* Suppoſition firſt, and then I'll make *mine* afterwards, and by that means deſtroy them both. *Do you ſay*, Matter *may* have Unknown Properties, by which it may Think and Will. And *I'll ſay*, Matter *may not* have Unknown Properties, by vertue of which it may Think and Will; or Matter may have Unknown Properties, by means of which it ſhall be Impoſſible for it ever to Think or Will. And pray in this Caſe, Which of us Two has got the better? 'Tis evident, that to talk at this rate, let it be on which ſide it will, is the very ſame thing as *holding one's Tongue*; 'tis actually of the ſame Moment and Conſequence, as to the Point in Debate, as *never ſaying a word* of the Matter, or as repeating one of *Æſop*'s *Fables* would be: and no more.

And therefore the *Deiſts*, with all their Noiſe and Boaſt upon this Head, (as if they had ſtarted a Difficulty plainly unanſwerable) *do hereby gain in Point of* Argument, *juſt as much as that Perſon would in* Quantity; *who after the Sums* n, m, p, r, &c. *Poſitive*, were valued with the Sums n, m, p, r, &c. *Negative*, was to have the Reſult of the whole fall to his ſhare. I wiſh them much Joy of their Advantage.

COROLL.

Hence we ſee upon what arrant Trifles theſe Men are forc'd to lay the Streſs of their Cauſe.

For 'tis but SUPPOSING *as they do, and with the ſame Reaſon, and upon the ſame Grounds*, that they do; and there's an End of the Buſineſs. And is not this a noble Foundation, to hazard all the Intereſts of another Life upon? Let them that do ſo, juſtify their Pretenſions to good Senſe and Reaſon, if they can.

SCHOL.

To put the Argument upon the faireſt and moſt equal Foot between *us* and *them* (that they may ſee what *gainers* they are, with all the moſt liberal Conceſſions that can be made) I have allow'd them an equal Advantage with our ſelves in the Point of SUPPOSING: That is, I have taken it for granted, that they have as much Right to ſuſpect *arbitrarily*, that Matter *may* think by vertue of ſome *Unknown* Properties; as we have arbitrarily to ſuppoſe, that it *may not.* But after all; what *if there ſhould be terrible ſhrewd Grounds of Suſpicion, from Obſervation and Experience*, That MATTER DOES NOT THINK AT ALL; Who has the Advantage then? I hope upon ſober and mature Conſideration, it may appear to theſe Gentlemen, that we certainly Reaſon better, in ſuppoſing Matter *may not* Think *by any Unknown Properties*, under ſtrong Grounds of Suſpicion, *that it is entirely void and deſtitute of Thought*; than they do, in ſuppoſing it *may* Think by vertue of Unknown Properties, under no juſt Grounds of Suſpicion *that it Thinks at all.*

I would have them therefore conſider this Point a little: For it would be an ugly Thing for Men to have been at the Expence of *Wit and Study*, in labouring a fine Hypotheſis of Matter's Thinking, by a Set of hidden myſterious Properties; if it ſhould prove true at laſt, *that there is no Thought at all in the Caſe.*

And thus much ſhall ſuffice for the *Firſt* Thing propos'd.

I ſhall now, in the *Second* Place, demonſtrate, *That this Hypotheſis of Matter's Thinking, by vertue of ſome Properties that are abſolutely unknown, does moſt evidently force the Deiſts, upon all the Inconveniences which they propos'd to avoid, in the very Invention of it :* and conſequently, that *whatever Opinion they ~~may have~~ had amongſt them, of the Happineſs of the Diſcovery, it is in reality the moſt unlucky Stroke they could well have made at themſelves.*

For the clearer Underſtanding of this, I ſhall,

Firſt, Briefly ſhew, *what the Deſign* of the Hypotheſis muſt be, if it has any Deſign at all, that can be of real Service to *them*, conſider'd *as Enemies* of the Chriſtian Religion : and *what thoſe Inconveniences* or bad Conſequences are, which muſt be intended hereby to be avoided.

Secondly, I ſhall evince, that inſtead of avoiding, they do hereby run upon all thoſe very bad and ungrateful Conſequences; and that *inevitably*.

N. B. When I ſay here, *they muſt be inevitably forc'd upon ſuch Conſequences*; I ſpeak

I ſpeak in the common Stile and Language of the World; in which we uſually ſay, a Man *muſt* be forc'd upon this or that Conſequence: meaning, *unleſs he will run upon palpable and egregious Abſurdities.* I mean the ſame here: I intend, that theſe Gentlemen *muſt* ſtand by *theſe Conſequences*; or elſe by *others*, which will not be tolerable amongſt Mankind. And where any of theſe *forbidding* Things ſtand in a Man's Way, we commonly ſay, he *muſt*, or is *forc'd* to do otherwiſe.

To proceed now ——

For the *Firſt* of theſe. I take the State of the Caſe to be plainly thus:

The *Goſpel-Revelation* ſuppoſes us to be Creatures of a much nobler and diviner Frame, yea of quite *another* Make, than the *Schemes* of Uncharitable *Atheiſts* and *Deiſts* will allow us to be of. They indeed have made the whole *Univerſe* a meer Lump of Matter; and *Man*, the moſt elegant and lovely Creature of all; they have complimented no higher, than to give him the Title of the beſt and fineſt Piece of *Clock-work.*

They have diveſted us of all our *Intellectual* Powers, and made up our very *Souls* of *Wheels* and *Springs*; ſo that we are only a Set of Moving pratling *Machines*, one Remove or two above the Ridiculous *Puppets*, which *we our ſelves* make, for common Sport and Diverſion. 'Tis true indeed, theſe People have allowed the little *Engine* they call *Man*, ſuch a thing as *Brains*. But 'tis certain they can ſerve to no manner of purpoſe: For *Brains* of Their Compoſition, can *reaſon* no more than *Threads* and *Wires*; and an *Intelligent Creature* may as well be expected from the *Tools* of any Curious *Artificer*, as to reſult from that *Apparatus* of Materials, which our Modern Unbelievers have prepar'd for the making of him up. So that it ſignifies but little to have given him a *Voice* to ſpeak, *Legs* to move about, with fine *Shape* and *Action*, and a graceful *Air*; when at the ſame time they have made it Impoſſible for him to *underſtand*, or do any thing that a *reaſonable* Creature, as ſuch, ſhould perform.

But the *Chriſtian Religion* gives us quite another Account of our *Conſtitution*. It furniſhes a noble Idea of a *Thinking*

ing Subſtance, diſtinct from our Bodies; the far better and more valuable Part of us, and the glorious Image of *our Maker*. A *Being*, which tho' at preſent houſ'd in a little Syſtem of Matter, yet is not fix'd for compleat Settlement there; being made capable of *future Exiſtence*, and wrought up for Immortality. Accordingly the Goſpel directs all our Views to *another* State; telling us, we ſhall as certainly exiſt in a *future*, as we do now inhabit the *preſent* World, from which we are ſhortly to remove.

But then, as this Scene of another World, opens *two ſeveral Ways* before us; giving us on *one* Hand, *ſuch Proſpects of Pleaſure*, that all we count *Beautiful* here, bears no proportion to them; and on the *other* Hand, thoſe, which are as *gloomy and terrible*: So theſe Gentlemen, who for *ſome Reaſons*, have found it neceſſary, to repreſent all this as pure Fable and Romance; have by Conſequence found themſelves oblig'd to *eſtabliſh a ſet Scheme*, in order to their doing it with a better grace. I have *ſomewhere elſe* trac'd the ſeveral Steps of this Scheme, and for that Reaſon ſhall not repeat them here: 'Tis enough to ſay, that the Reſult of all is, *That Matter muſt Think.* And whether it be by Properties that are *known* or UNKNOWN; yet ſtill if it be *but* MATTER that Thinks, if there be nothing elſe in the Caſe *but this*; there's Scope enough left to diſpute the Truth of the Goſpel, and laugh at all the Penalties it threatens to Unbelievers. For MATTER, a thing which puts on ſo many various Shapes and Appearances, and has ſo different a Dreſs in every Corner of the Univerſe; a Subſtance, which undergoes ſuch numberleſs Tranſmutations, being here an *Animal*, and there a *Tree*, and in other Regions a *Star* or a *Comet:* This gives no Proſpect of a State of Thought, like to be *very Enduring.* And therefore they, who had *prudently* reſolv'd to lodge Thought and Underſtanding here, had a plauſible Handle given them, from the very fickle and precarious Condition of the Subject; to tell themſelves, *that Thinking-Matter might become Unthinking, and Reaſon it ſelf expire, with a particular State and Mode of the Particles.* It ſignifies not any thing, by *what Power* in Matter (whether one or more, that are either obvious to us, or that lie conceal'd in the dark)

dark) it comes to paſs, that we are able to Think and Reflect. If it be but that *mutable*, that *uncertain* thing, (and not a Subject, whoſe more noble Nature ſhould ſeem to exempt it from all ſuch Viciſſitudes) let it be but *this* that thinks; and there's ſufficient room to evade the Terrors of an *After-State.*

In ſhort, the Hypotheſis is levell'd againſt *Futurity: 'Tis a Fence againſt the Belief of Puniſhments in a Life to come.* Theſe Gentlemen deſign to perſwade themſelves by it, *that the Goſpel is a meer idle Tale*; that the World was cheated and abus'd by Chriſt and his Apoſtles; and that (whatever theſe have ſaid to the contrary) their ſcatter'd Syſtems ſhall exiſt hereafter, *unthinking, unconſcious, and knowing no painful Reflection.* This is the true ſenſe and meaning of it.

Let us now therefore ſhew in the *Second Place*, that they do not *avoid* the Danger of theſe Conſequences, but moſt certainly *run upon it*, in framing ſuch an Hypotheſis to themſelves.

Now in order to the clearing up of this, I in the firſt place propoſe this *Dilemma:* viz.

Thoſe abſolutely Unknown Properties of Matter, by which it is pretended, it may Think and Will; do either depend on A SYSTEM, that is, on the Diſpoſition of Matter into a Syſtem: or they do not depend thereon.

It will be *hard* ſaying the *Former*; but it will be worſe ſtill to allow the *Latter:* and yet one of the two muſt be ſaid, becauſe in the Nature of Things, it is certainly and determinately true, that the Caſe lies either one or other of theſe ways.

Let us therefore make the Enquiry, and ſee which way it muſt lie, according to all our Common Notions and moſt Natural Ideas of Things; examining every Step of Poſſibility, Probability, or plain and evident Truth, where we find each of them, as we go along, and ſtating the genuine and undoubted Conſequences, of the Suppoſitions on both ſides. And for Perſpicuity's ſake, in the doing of all this, I ſhall advance by the moſt eaſy and natural Steps I can.

PROP. I.

The Formal Nature, of A SYSTEM, as ſuch, conſiſts in the meer Arrangment or Diſpoſition of Parts: It betokens, that ſome Parts or Portions of Matter, are diſpos'd according to ſome ſtated Law, or plac'd in ſome certain Order and Relation to one another.

'Tis true, that a *Syſtem* includes or ſuppoſes *Body*, with all its Eſſential Properties and Qualities; but theſe continue *out* of a Syſtem, as well as *in* one, and the proper *Formality* of the Syſtem evidently lies, in the *Order and Arrangment of Parts:* For when this is *alter'd*, the Syſtem is alter'd; or when *deſtroy'd*, the Syſtem is ſo *likewiſe.*

PROP. II.

Proper and Real Dependance, ſuppoſes Proper and Real Influence, in the Conſervation of the Exiſtence of any thing: And if the conceal'd Properties of Matter, by which it Thinks and Wills, have any Proper Real Dependance on a Syſtem, there is ſome Proper Real Influence ariſing from a Syſtem, for the Conſervation of their Exiſtence.

COROLL.

Therefore if it be certain, that there is no ſuch *Influence*, on the Part of a Syſtem; it will be certain likewiſe, that there can be no ſuch *Dependance*, on the Part of the Unknown Properties. And if there be not; then ſomething worſe will follow.

PROP. III.

The Powers of Thinking and Willing, are ſomething REAL and POSITIVE in Matter; not meer Relations or extrinſick Denominations only.

For they *depend not on any Conception or Apprehenſion* of ours; but the Subject is really endow'd with them, whether we conceive of them or no: and they do in a proper way of ſpeaking, *produce real and poſitive Effects.*

PROP. IV.

If in the Nature of Things, Real and Proper Influence, may be attributed to a meer Order *or* Relation; *then the Powers of Thinking and Willing (or the ſecret Properties from whence they ariſe) may have Real and Proper Dependance on a Syſtem: but if otherwiſe, then not.*

For a Syſtem, *as ſuch*, is no more, than the meer Order and Diſpoſition of the Parts; and if this by its own proper Influence, without any *other Cauſality* intervening, can contribute any thing to the *Production*, *Conſervation* or *Support*, of a Real *Poſitive* Power or Quality *reſiding in* Matter: 'tis certain that Real Power or Quality, will ſo far forth have *Real and Proper Dependance*, on that particular State and Order of Things, (that is, on the *Syſtem*) and no farther. But if this ſuppos'd Vertue of a Syſtem, appears plainly, to be *Phyſically* Impoſſible, to be inſupportably fooliſh and abſurd, to be contrary to all our Natural Notions and Experiences of Things; then the *Dependance* of the *Thinking* Properties on it, muſt I think be entirely given up.

SCHOL.

'Tis a pretty odd Conſideration; that ſome, and thoſe the *moſt noble* and *excellent Qualities*, or Properties of Matter, ſhould abſolutely depend, *upon the bare throwing of it into a Syſtem*; and that others ſhould not be at all affected, one way or other, whether *in* or *out* of ſuch a State. That ſome ſhould be ſo *ſtable and permanent*, and others ſo *fleeting* and precarious. Matter, we ſee, retains its *Diviſibility*, *Figure*, Power of *Coheſion*, &c. let it undergo what Changes or Revolutions it will; but it ſeems, *A Syſtem of it can't be taken to pieces, but it muſt preſently be ſtripp'd of the moſt glorious Properties it was poſſeſs'd of.* Do but diſſolve the Order and Relation of the Parts, and all the *Conſcious*, *reflecting* Powers, die away immediately, and for ever forſake the Lump. As on the other hand, reſtore but the Formality of a Syſtem, *and you produce new*, *real*, *poſitive Powers*, *and turn Matter from a ſenſeleſs*, *into a thinking Subſtance.*

So that at this rate, whether by ſet Counſel and Deſign, or by Ten thouſand Accidents that may happen; *we may revive and deſtroy*, *improve or diminiſh*, *and ſo go on by endleſs Viciſſitudes*, *reviving and deſtroying*, *improving or diminiſhing the Powers of Thought and Will*; *which lie entirely at the Mercy of the Maker*, *or Manager of a Syſtem.*

Nor is all this Talk meer *paint and gloſs*, or ſetting a thing in a falſe Light, by Artifices of Words, or invidious Turns. But 'tis the genuine and real State of the Caſe, 'tis the native unconſtrain'd Reſult of the Suppoſition. For if you aſſert and ſtand by, a proper neceſſary Dependance of *theſe Powers*, on the Syſtematical Arrangment or Diſpoſition of Matter; if you allow them no other Foundation in the Nature of Things but this *meer Order or Relation:* then unleſs you can *limit the proper Requiſites of Syſtems in order to Thought*; and determine in what Caſes a Change ſhall be attended, with the *Deſtruction* or *Reſtoration*, the *Diminution* or *Increaſe* thereof; you can never fairly avoid thoſe Conſequences I mention. You may break through them indeed, but you can't get quit of them in a regular way. For you are to remember, that the Streſs of the Argument lies upon a *Syſtem* AS SUCH; and not upon a *Syſtem* AS SO and SO QUALIFIED, or UNDER SUCH and SUCH CONDITIONS. So that if you ſhift the Point hither, *you quite alter the State of the Queſtion*; and if you don't, *you can never avoid the Conſequence.* But there's enough ſaid of theſe bare-fac'd Abſurdities: However, we ſhall more fully ſee the Reſult of all, in the following Propoſitions.

PROP.

PROP. V.

If thoſe Unknown Properties, by which 'tis pretended, Matter may Think and Will; are ſuppos'd to reſult from, or entirely to depend upon, A SYSTEM: Then 'tis either upon the Syſtematical Diſpoſition of Matter taken at large, and in General; *or elſe upon a Syſtem*, ſo and ſo particularly *built and modified:* And each Hypotheſis is attended with Grand Inconveniences.

PROP. VI.

If the Aforeſaid Properties or Powers are ſaid entirely to depend upon the meer Syſtematical Diſpoſition of Matter in General; Then the Maintainers of that Hypotheſis, are expos'd to all the moſt diſmal Uncertainties imaginable, with reſpect to A STATE OF FUTURE CONSCIOUSNESS and REFLECTION.

For as 'tis not every *Heap* of Matter, that can fall under the Denomination of a *Syſtem*; ſo who can demonſtrate, what are, or are not, *the proper Requiſites to the Being of a Syſtem in General?* Who can fix the preciſe *Point*, wherein the Formal Eſſence of it lies? SOME certain *Order*, SOME *Diſpoſition*, SOME *Relation* of Parts, is undoubtedly neceſſary. But WHAT Order, WHAT Relation, WHAT Diſpoſition? Can you limit the Univerſal Properties of the *Arrangment*, and ſay aſſuredly; *Parts of Matter* ſo and ſo *diſpos'd or related, will be a Syſtem, but* thus and thus, *they will not: in* this *Caſe, there are all the neceſſary Requiſites, and in* that *there are not*: So that *here* a Proper real Syſtem will ariſe, and *there* will ariſe none at all, whatever Quantity or Stock of Matter lies ready for the making of it up. Unleſs theſe Gentlemen can do this, they are in danger, by every poſſible Law of *Motion*, *Coheſion*, or *Arrangment* of Particles in Nature; and there is not one of them all but may juſtly ſtrike them with Ten thouſand Terrors. For as there are Multitudes of exact and regular Syſtems, where our Senſes can diſcover nothing of *a certain Law*; nay, where nothing but Rudeneſs and Confuſion appear: So upon this account, there can be no poſſible Security againſt Thought and Reflection, in *a ſeemingly rude Heap of ſcatter'd Duſt*. *Underſtanding* may ſpring up, as well as not, in a thouſand Parcels of the *Diſſolved Body*. Nay the ſeparated Parts of our Machines, in the general Hurry and Viciſſitudes of Matter, may be work'd into *Numberleſs Varieties of Syſtems*; all which may have a certain, common and conſtant Relation to each other. And conſequently, *we may have vaſtly more Perception and Conſciouſneſs in that divided State, than ever we had when we were all in one Piece: Or it may be finer and quicker, or more ſmart and piercing; according as the Syſtems are combin'd and diſpos'd with one another.*

So that here we are let into A NEW (but VERY POSSIBLE) STATE OF THINKING, in which for any thing that appears, we may be as much liable to *Anguiſh and Diſtreſs*, to *Pain and Puniſhment*, upon the Diſſolution of our preſent Syſtems; as if we were ſuppos'd to have *a Thinking Subſtance totally diſtinct from Matter*; which ſhould ſurvive the Fatal Stroke of Death, and render us capable of feeling *all the Impreſſions* (whether grateful or uneaſy) *of another World.*

PROP. VII.

On the other hand: If thoſe Properties or Powers, are ſaid entirely to depend on any particular Sort of Texture, Form, or Modification of a Syſtem: Then I ſay, *that this amounts in Conſequence, to a plain Relinquiſhing of the Grand Hypotheſis, of theſe Properties being UNKNOWN.*

For what does *the Particular Texture or Modification of a Syſtem*, denote, *at moſt*, but this; *viz.* That the Parts of Matter, of ſuch or ſuch *Figures* and *Sizes*, endow'd with ſuch or ſuch *Forces*, *Motions*, *Coheſions*, Mutual *Endeavours*, to or from one another; that theſe, I ſay, thus and thus endowed, are rang'd and diſpos'd after this or that *particular Way*, or according to ſuch or ſuch a *peculiar Law?*

I ask *them*, whether according to the Common Notions of the Philoſophical World, there can be any thing meant by it, but this? And if this be ſo; then to ſay, that the Unknown Properties by which Matter *Thinks* and *Wills*, do entirely depend upon ſome *peculiar Textures or Modifications of a Syſtem*; is to ſay, that they entirely depend upon *Figure*, *Size*, *Force*, *Motion*, *Coheſion*, &c. ſo and ſo diſpos'd and adjuſted.

To ſay this, is evidently to fix the proper Origin and Riſe of them, in Principles that are entirely KNOWN to us.

For if they entirely depend on theſe; 'tis from theſe that they have entirely their Efficacy and Vertue, to render Matter a Thinking Subſtance.

That is, Matter is render'd a *Thinking* Subſtance, by Principles or Properties; which, inſtead of being entirely UNKNOWN, are entirely the contrary. And therefore to take this End of the Argument, is in Conſequence plainly to relinquiſh the *Grand Hypotheſis*.

Perhaps theſe Gentlemen will be ready to ſay, that even tho' they lay the Streſs of the Matter here, as we ſuppoſe it in the preſent Propoſition; yet that by ſo doing, they do not quit their Hypotheſis of *Unknown* Properties. *For granting* (ſay they) *the Conſequence to be thus far true*, viz. *that they have an abſolute and entire dependance upon Figure*, *Coheſion*, &c. *which are* Known *to us*; *yet ſtill the formal intrinſick Eſſence of them continues unknown*; *this lies wrapt up in Darkneſs*, *out of all our Views and Comprehenſion*; *ſo that tho' we are ſure thus far of it*, *that whatever it be*, *it muſt be allowed to have neceſſary dependance on thoſe well-known Properties or Qualities before-mention'd*; *yet ſtill we don't know the proper formal Eſſence of them*, *and conſequently do not deſert the Hypotheſis*, *as you argue we do.*

But the *Anſwer* to this is very ſhort and eaſy; and, I think, as plain.

For we know not *the proper formal Eſſence* of any thing. (And theſe Gentlemen, even found their Hypotheſis, of the Poſſibility of Matter's Thinking by ſome *Unknown* Properties, upon this very Suppoſition, that we do not do ſo: For ſay they, becauſe we have not a thorough Knowledge of the Eſſence of Matter; therefore it *may* think, by vertue of ſome Properties which are abſolutely *unknown* to us) All that we can do, is by *juſt Obſervation and Experiment*, or *certain Argument and Deduction* founded thereon ; to know that Things have ſuch and ſuch *Properties and Effects*, or have ſuch and ſuch *relations* to, and *dependencies* on, other things. This is the Sum of all our preſent Knowledge: and when we have attain'd this, we ſay we KNOW Things ; *viz.* becauſe we have proceeded as far towards the compleat Knowledge of them, as our *ſhallow Comprehenſion*, and the *imperfect Methods* we at preſent make uſe of, are able to carry us, or will ſuffer us to go.

And therefore, when theſe Gentlemen allow, that thoſe Properties of Matter (which they call *Unknown*) are ſuch, whoſe plain and viſible *Effects*, are the well-known Phenomena of *Thinking* and *Willing* ; as alſo, that thoſe Properties have their entire Dependance on *the peculiar Texture or Modification of a Syſtem* ; that is, on ſuch Principles, as all the Philoſophical World will agree, to be ſufficiently well *known* to us :

It follows, that however we know not the Formal Eſſence of them (*which like all other Eſſences muſt be unknowable by us*;) yet that ſpeaking in the *common Stile and Language* of the World, we may be properly ſaid to *Know* them; ſince to know *thus much* of them, is to *know* (I think) *as much*, as we do of any thing elſe, that we are commonly ſaid and allow'd to *know*, in the World.

Therefore by granting this, they do infallibly abandon their *Firſt* Hypotheſis.

PROP. VIII.

If the Unknown *Properties, by which Matter Thinks and Wills, do NOT DEPEND upon a Syſtem*; then upon the *DISSOLUTION of a Syſtem, Matter muſt ſtill continue endow'd, with the ſame Powers of Thinking and Willing*; *and conſequently, ſtill continue, A THINKING SUBSTANCE.*

COROLL. I.

The *Deiſts* can't avoid this Conſequence, unleſs they can demonſtrate the two foregoing Propoſitions to be *falſe*: that is, unleſs they can demonſtrate that to be falſe, which is plainly and evidently true, and muſt be ſo, I won't ſay in the Opinion of every *Free* Thinker, but I will of *impartial* and unbiaſs'd one's.

COROLL. II.

And if they can't do this, it will follow; that they can conclude nothing elſe but this, *viz.* That THEY SHALL CONTINUE TO THINK and REFLECT, tho' the preſent Frame and Texture of their MACHINES be DISSOLV'D at DEATH.

And thus they unavoidably run, upon *that very Conſequence*, which, of all Conſequences that can be drawn, muſt of neceſſity be the moſt formidable to *them*; and for the pure ſake of avoiding which, 'tis evident, that the *Hypotheſis* it ſelf was invented. This is unlucky above all things; 'tis a wretched Coincidence, *that* *the very Scheme which was contriv'd on purpoſe, to help them out of a difficulty, ſhould ſerve to entangle them Ten thouſand times more, and make it impoſſible or them ever to get clear.*

But thus it plainly is in their Caſe; and thus it always will, and muſt be, *where Hypotheſes are not founded upon Nature and Truth, but arbitrarily invented, meerly to ſerve a Turn.* In ſuch Caſes, People muſt blunder, let them do what they can; let them manage their Point with ever ſo much Art and Sagacity, yet if *Nature and the Reaſon of Things* be againſt them, the upſhot of all will be only this, that they have been making *Toils* to catch and enſnare themſelves.

SCHOL.

The foregoing Argument, which lies ſcatter'd up and down in various Propoſitions, is thus briefly ſumm'd up. And I am the willinger to throw it into this conciſe Form; becauſe our Adverſaries, who are the Perſons chiefly concern'd to know whether it be concluſive or no, may by this means have the compleater

View of it, in order to their own Satiſfaction.

Thoſe *abſolutely Unknown Properties* of Matter, by which (we are told) it may Think and Will ——

Are either of ſuch a Nature, as neceſſarily to require and depend upon A SYSTEM: Or elſe not.

If the *Former:*

Then 'tis either on a Syſtem IN GENERAL, and *as ſuch:*

Or on a Syſtem, as ſo and ſo PARTICULARLY MODIFIED and Diſpos'd.

If it be the Firſt; *Then they are expos'd to the moſt direful Hazards and Uncertainties imaginable; nay 'tis almoſt demonſtrable, that they cannot be ſafe:*

If the *Second; They give up the Cauſe, and as good as come back to their KNOWN Properties again:*

To which I add farther; That unleſs they could aſſure themſelves, that amongſt all the Revolutions and Changes of Matter in the Univerſe, a Syſtem once diſſolv'd ſhould never be built again; that it can only *looſe*, but can never *recover*, Thoſe *particular* Modifications, which once ſet it a *Thinking:* Unleſs they can do this upon ſome very ſolid and rational Grounds, they have an ugly Proſpect of Danger and Uncertainty this way alſo. And as they know very well that 'tis Impoſſible for them ever to have any ſuch Aſſurance as this comes to; ſo I think they have nothing to do, but to conclude that theſe wild Schemes leave them expos'd to Infinitely more *hazards*, than *Wiſe* Men, one would think, ſhould ever *endure* to think of.

Thus the Caſe ſtands, upon the Suppoſition, that the *Thinking Properties*, neceſſarily require or depend on A SYSTEM. But if they do not depend thereon; *Then Matter muſt Think and Will, after the* DISSOLUTION OF A *SYSTEM as well as before; nor is there any poſſible Remedy for it* (ſpeaking *Phyſically.*) I ſay *Phyſically ſpeaking:* For by a Special Extraordinary Act of *Divine Power*, the Conſequence may be avoided. If *Omnipotence it ſelf* interpoſes, and ANNIHILATES all thoſe Properties, juſt at the DISSOLUTION of a SYSTEM; then indeed I grant, theſe Gentlemen may fairly ſtand by it; *That tho' the Thinking Properties do not depend upon a Syſtem, yet it does not fol-*

low, that Matter muſt continue to Think and Will after the Diſſolution of it.

But ſurely, theſe People (even with all their *Credulity* and Fondneſs, which they ſhew upon all Occaſions, where they have an *Intereſt* concern'd) do neither believe themſelves; nor hope to perſwade us to fancy they do believe, *that any Acts of Miraculous Power ſhall ever interpoſe in their Favour.* What ſhall Omnipotence exert it ſelf, on purpoſe to keep them from Thinking and Reflecting, *when their Syſtems are diſſolv'd?* Shall Matter be ſtript of the brighteſt Ornaments of its Eſſence (thoſe glorious Powers of Underſtanding and Will) for fear the *Uſe* of them ſhould prove *troubleſome and uneaſy* to theſe Gentlemen HEREAFTER? They ſhall live within their own *Large Rules*, here in the preſent World, and be in all reſpects at their own diſpoſal; they ſhall *think, believe*, and *do*, juſt what they themſelves have a mind to; and then at laſt, forſooth, when their Syſtems fall in pieces; to prevent bad Conſequences, and ſave *them* harmleſs, *God Almighty muſt Annihilate the Thinking Properties*, and turn Matter into a ſtupid inſenſible Lump.

A pretty Story this! A well-contriv'd Scheme; Full of *Charity* and Good-Nature to themſelves, but not altogether ſo well repleniſh'd with *Truth* or *Probability*.

However as we have ſtarted this Difficulty for them, out of a regard to *Truth* (which is never afraid of any Suppoſitions or Conſequences) as alſo, that by giving them all the *fair Scope* imaginable, they might have no room left to make any Objections themſelves: So I ſhall now ſhew, in a ſtricter way of Arguing, *that they can make no manner of uſe of it*, and that it will afford them no manner of Protection, from the *Terrible Conſequence* of the *Laſt Propoſition*.

In order to this, I lay down the Two following *Principles* or Aſſertions, which I believe will paſs without diſpute.

I. *That a Perſon propoſes very fair, who but craves leave to make a Suppoſition, with a Thouſand times the Evidence for the Truth of it; that his Adverſary has, for the Truth of the Suppoſition, which he lays down.*

II. *That an Adverſary, who refuſes to ſtand to ſuch a Propoſal, cuts himſelf off from all Claim and Pretenſions of ever making his own Suppoſition.*

This premis'd, I ſay in the Next place—

PROP. IX.

The Deiſts *can neither ſafely* make *the Suppoſition, that* Almighty Power *interpoſes, to* annihilate *thoſe Properties upon the Deſtruction of a Syſtem; nor can they ſafely* refuſe *to make it.*

The Reaſon of which is evidently this. In ſeveral Points debated betwixt *Them* and *Chriſtians*, the Controverſy muſt infallibly be decided in our Favour, provided *we* may be allowed to bring in *the Almighty Power of God* upon certain Occaſions, as *they* do here in the preſent Caſe.

Now in any of all thoſe Caſes, I'll offer to give them, not leſs than *one* (or if they have a mind to it, *two*) *Thouſand* times the proper rational Evidence; to ſhew that the Divine Power may juſtly be conceiv'd, to be actually concern'd in bringing about ſuch or ſuch Events; that they can give me, to make it appear truly reaſonable to believe, that it will ever exert it ſelf in this buſineſs of *Annihilating* the Thinking Properties of Matter, upon the Deſtruction of a *Syſtem*.

Now (by *Aſſert.* 1.) this is an unexceptionably fair Propoſal. I ask therefore, whether they will accept it, or not? *If they do*, then they lie open to all the Uſes we ſhall make of a Suppoſition of *Extraordinary Divine Power* in other Caſes; and upon *that condition* I'll releaſe them from *this* Argument.

If they do not; then (by *Aſſert.* 2.) they are cut off from ſuppoſing *Almighty Power* to ſtep in, in the preſent Exigency. Therefore they muſt ſuppoſe the Thinking Properties ſtill to continue; and conſequently *Matter to remain a Thinking Subſtance*, after the Diſſolution of a Syſtem.

So that 'tis plain they are preſs'd either way; they can't *make* the Suppoſition, without *giving up their Cauſe* in other reſpects; nor they can't *let it alone*, without expoſing themſelves to a direful Neceſſity of *Thinking after Death*.

Well then: this being the certain Reſult of the NON-DEPENDANCE of Thoſe Properties on A SYSTEM, and no Remedy being ever to be pretended from Almighty Power in the Caſe; we will ſee now, in what the whole Controverſy muſt of Neceſſity terminate.

PROP. X.

The Reſult of all, as to the UNKNOWN Properties of Matter, by which it is ſaid to Think and Will, muſt be this; viz. *That They abſolutely and entirely DEPEND ON A SYSTEM.*

I am ready enough to ſuppoſe, that the *Deiſts* will ſay here, *that this is what they Affirm, and what they would have: They believe, they allow, theſe Properties do depend on a Syſtem, and this is what they pretend to ſtand by.*

And let it be ſo: But I was reſolv'd not to take their Word for it, but demonſtrate from the very Original, that it *muſt* be ſo.

I would not let the Matter reſt, upon any Capricious Opinion or Conceſſion of theirs

theirs (which they might change or ſhift as they ſaw occaſion) *but bring it to a ſure and certain Concluſion, which ſhould ſettle the Point, and not leave it in their Power to flinch or ſtart to any other Suppoſition.* If I had not done thus, they might have return'd upon me, with a fine plauſible Story, about *the Extraordinary Power of Almighty God*; which, in their way of repreſenting things, they might have made ſome good uſe of.

What precarious Reaſoning is this (might they have ſaid) *to infer the certain unavoidable Neceſſity of Thinking, after the Diſſolution of a Syſtem, only becauſe theſe UNKNOWN Properties, do NOT depend upon a SYSTEM? May not the All-powerful Being Annihilate them? May not he make them CEASE TO BE at Death? And ſuppoſe we ſhould ſay he does do ſo, who could confute us, or prove the contrary?*

And the truth on't is, they may with as much Face of Reaſon ſuppoſe this, as a Thouſand other things, which they do actually ſuppoſe, in their Diſputes with the Chriſtians.

And thus I had left this ſide of the Argument ungarded and expos'd; expos'd to the Inſults of an idle precarious *May be:* Whereas now it's ſecur'd, and out of all Danger; for they'll not eaſily be perſuaded, to ſuppoſe any thing about the Interpoſition of *Almighty Power*, upon *ſuch terms* as I have propos'd to them; and they can't for *ſhame* pretend to do it upon any *other*.

PROP. XI.

Since thoſe Unknown Properties, by which Matter Thinks and Wills, muſt of Neceſſity depend on a SYSTEM; alſo ſince there is incomparably more danger and hazard in making them depend on the Syſtematical Arrangement or Diſpoſition of Matter IN GENERAL, than on ſome PARTICULAR Textures or Modifications of a Syſtem, (as appears from *Prop.* VI.) *It follows, that the* Deiſts *muſt centre in this Concluſion at laſt*, viz. That thoſe UNKNOWN Properties, by which Matter Thinks and Wills; have their *entire Dependance*, on ſome PARTICULAR TEXTURES or MODIFICATIONS of a Syſtem.

COROLL.

If therefore they can't maintain this Point, *then all the Diſcourſe about Matter's Thinking by Unknown Properties, muſt be for ever laid aſide:* But if they can handſomely, and with *a good face of Truth*, defend it; then I allow, they may *yet* be indulg'd the liberty of trifling ſo far, as to offer a *Poſitive* Suppoſition of their *own*, concerning Matter's Thinking by Unknown Properties; againſt a *Negative* Suppoſition of *ours*, and of equal Force and Authority, concerning Matter's *not* Thinking by Unknown Properties: I ſay, if they like DOING NOTHING (and this plainly amounts to no more, as appears by a foregoing *Propoſition*) they may ſtill divert themſelves that way. Whereas if if this Point be really not tenable; then they are not to be allow'd, *even that* poor Entertainment of *ſaying and doing nothing*.

PROP.

PROP. XII.

To Enumerate ſome of the CONSEQUENCES, *which attend the Suppoſition, of Matter's* THINKING *by vertue of* UNKNOWN *Properties, whoſe* ENTIRE DEPENDANCE, *is on ſome* PECULIAR TEXTURES *or* MODIFICATIONS *of a Syſtem.*

If this be True ——

Then a *Poſitive* Quality or Power, *really inhering* in a Subject, may have a *neceſſary Phyſical Dependance*, as to its entire Being and Conſervation, on a Meer ORDER or RELATION.

For any Imaginable *Particular Modification of a Syſtem*, being no more than *Figure, Size, Motion, Endeavour* of Particles, *&c.* diſpoſed and adjuſted after *ſuch or ſuch* a manner: It's evident that the proper formal Nature of *that Modification*, is no more nor no other, than the *bare Relation* of them all, to one another, as *ſo and ſo* diſpos'd and adjuſted.

Hence then; a *Poſitive* Quality or Power, *really inhering in a Subject*, may have a *neceſſary Phyſical Dependance*, on That; which in the Nature of Things, *has no proper Phyſical Influence*, on which alone (according to all our Common Notions) proper Phyſical Dependance is to be founded.

Again: That a Poſitive Quality or Property, really inhering in a Subject, and of *a quite different Specifick Nature*, from the reſt; ſhould yet reſult from, or have its ſole and abſolute Dependance, on the meer Diſpoſition and Arrangment of *thoſe others*, from which notwithſtanding it is thus *ſpecifically different*.

For thoſe who ſuppoſe UNKNOWN Properties in Matter, are bound to ſuppoſe them *Specifically diſtinct*, from all that are KNOWN. Becauſe, if the *Known* ones, with all or any of their *Combinations*, were ſufficient to do the grand Buſineſs of producing *Thought*; then where were the Senſe of ſuppoſing any UNKNOWN ones at all? Therefore they muſt ſuppoſe them *Specifically diſtinct*.

Farther: That *Size*, *Shape*, *Motion*, *Diviſion*, &c. which taken SEPERATELY and *apart by themſelves*, have no real proper Influence, to produce or conſerve, a *diſtinct Poſitive* Phyſical Property; may yet acquire ſuch a Vertue, *by being diſpos'd ſo and ſo in a Syſtem:* That is, that a Sum of proper *Nothings* or *No-influences*, being rang'd together, may make a real *Something* or *Some-influence.*

Again: That Properties, which are purely and abſolutely UNKNOWN, are yet ultimately to be reſolv'd into others, which are as much KNOWN to us, as any thing relating to *the Eſſences of Things*, can well be ſuppos'd to be, in the preſent imperfect State of Human Knowledge.

And to ſay no more: 'Tis evident, that at this rate, we are not advanc'd one ſingle Step beyond the KNOWN Properties, but do indeed, after all is ſaid and done, centre *there*, and *only there.* For in the Caſe of thoſe KNOWN Properties of Matter, the Sum and Subſtance of all that they can ever pretend to ſay is this: *viz.* That tho' they can't give an Account, HOW *Figure*, *Motion*, &c. do contribute to the Production of Thought; HOW the Particles of Matter muſt be *ſhap'd*, *diſpos'd*, *impeled* and *directed*, to make us Argue and Reaſon; or in a word, in what *particular Circumſtances* the formal Nature of Thought, does immediately lie and conſiſt: yet that it does *ſome way or other depend upon theſe Principles*, and that there's nothing but *Shape*, *Size*, *Motion*, *Impulſe*, and *Direction*, in the buſineſs.

And pray what do they ſay more, in the Caſe of the UNKOWN ones, according to the *preſent. Foundation*, we have brought the Argument to reſt upon?

• *Thinking and Willing* do abſolutely depend, upon certain Properties of Matter; but alas, thoſe Properties lie quite in the *dark*: Their Nature and Eſſence are entirely UNKNOWN; They can't ſay what they are; But thus much they are ſure of, that they depend upon a *Syſtem*; that they are ſomething which owe their Being and Conſervation, *to ſome Particular Adjuſtments of Figure, Magnitude*, *Motion*, *Coheſion*, &c. Only; wherein the peculiar Nature of that Adjuſtment lies, and what the *Specifick diſtinguiſhing Properties or Characteriſticks* of it are: As to this, they are entirely ignorant, and can ſay nothing of the

Matter. So that I think the Conſequence is very plain.

N. B. If theſe Gentlemen ſhould have Thoughts of making uſe of any [illegible]ſtances or Examples, whether in *Nature* or the Works of *Art*; *where by any ſort of Combination or Arrangement, a different thing from the Materials ſo combin'd and and arrang'd, appears to reſult*; and that in order to evade any of theſe Conſequences: I only caution them beforehand, that they be ſure to make their Examples pat and pertinent to the Caſe, *and ſuch as may ſquare in all reſpects, with the Conditions and Limitations here preſcrib'd.*

There is another thing likewiſe, which I would not have them miſtake, that they may not *complain*, as if I put the Labouring Oar too hard upon them.

When I ſpeak of the very great *Dangers and Hazards, with reſpect to a State of Future Thought and Reflection*, which this Hypotheſis leaves them expos'd to, unleſs they can be ſure that *New* Thinking Syſtems ſhall not ariſe out of the *Old* One's diſſolv'd: I don't hereby intend to propoſe it, as a Task and Buſineſs incumbent on them, to prove

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or make this out *to me*; but only to ſhew, that unleſs they can give *themſelves* [illegible] compleat rational Satisfaction about [illegible]; *they ought to look upon their own Caſe, as infinitely hazardous and uncertain.*

To Conclude: If after all, there were no more to be ſaid in the Caſe but this; it were abundantly ſufficient, to ſhew how little good they do themſelves by this Fiction of *Unknown* Properties, only to lay down this one Propoſition: viz. *That theſe Thinking Properties, being* (as they confeſs) *utterly Unknown, and therefore ſuch, whoſe* Nature and Extent, *whoſe* Power and Vertue, *whoſe* Poſſible, Probable, or Certain Conſequences and Effects, *they are and muſt be totally ignorant of: That therefore and for that very reaſon*, THEY ARE EXPOS'D; *They have nothing but Danger, Difficulty, Intricacy and Uncertainty before them*; which if they think and reflect upon, they muſt neceſſarily be much more UNHAPPY; and if they do not, much leſs WISE; than their Adverſaries the Chriſtians would have them to be. And ſo much ſhall ſuffice for *this Head.*

SECT.

SECT. V.

AS for the next; *which is God's endowing a Syſtem of Matter, with the Faculties of Thinking and Willing, by his Extraordinary Power:* I have diſcuſs'd that Point ſo far already (in the *Appendix* to a Diſcourſe concerning *the Reſurrection of Jeſus Chriſt*) that I do not at preſent ſee, what I can add more material to it; and therefore I am willing to leave it upon *that foot.*

In ſhort, the Meaning on't muſt be expreſs'd, one or other of theſe Ways.

Either, That God Almighty does *Extraordinarily* Enable and Impower, Matter to Think and Will, by vertue of thoſe Properties which are KNOWN to us.

Or elſe, that He does *Extraordinarily* add or ſuperinduce, the *meer Qualities or Powers* of Thinking and Willing, to or upon, a Syſtem of Matter, already inveſted with all its other Common Properties.

Or Laſtly, that He ſuperinduces or joyns *a real Thinking Subſtance*, with a Syſtem of Matter.

The *Firſt* amounts to a *Contradiction.* For God having plainly eſtabliſh'd *ſuch Laws*, in the Corporeal Univerſe, which make it *Impoſſible* for Matter to *Think*, by vertue of its KNOWN Properties: 'tis certain he neither can nor will (unleſs he were a *weak imprudent* Being, and therefore not A GOD) employ his *Extraordinary* Power, to ſubvert and overthrow thoſe Laws.

The *Second* I charge with theſe three Conſequences; which if the *Deiſtical* Patrons of this Opinion will agree to ſtand by, I'll make no ſcruple to yield them this Hypotheſis.

1. That it is giving up the Cauſe of *Pure Materialiſm:* Becauſe 'tis ſuppoſing *ſome Powers* in the Univerſe, which are not reducible to *Matter and Motion*, but are of a *Divine Extraordinary* Original.

2. That it leaves them altogether as much expos'd, with reſpect to *Futurity:* For, thoſe Thinking Qualities *extraordinarily* induc'd on a Syſtem, may with great Probability be *preſerv'd hereafter:* Nay without a poſitive Act of Omnipotence, to *annihilate* them, 'tis plain they

muſt be ſo; *Becauſe here's no dependance upon a Syſtem* in this Suppoſition.

3. 'Tis *unſufferable nonſenſe*, to talk of Qualities or Powers, *that are not the proper Qualitses or Powers, of ſome certain Subſtance to which they belong.*

Now *theſe* cannot be the Proper Qualities or Powers of *Matter*; Becauſe (by the Hypotheſis) they are *extraordinarily* ſuperinduc'd upon it.

And to ſay that they are the Qualities or Powers of a Subſtance, *ſpecifically diſtinct from Matter*; is to give up the whole Cauſe at once, and declare for a *Thinking Subſtance* diſtinct from Matter, which is what we contend for.

So that I think there's no need to ſay any more upon this Article neither.

SECT. VI.

WE are now come to the *laſt* Stage of our Survey. *Matter MAY BE Thinking Subſtance; becauſe no Contradiction reſults from joyning the Ideas of the Properties on both ſides.*

I had Thoughts indeed at firſt of proſecuting this very particularly, and had actually made proviſion for ſo doing: But conſidering with my ſelf, that it is a poor idle *May-be*, not much talk'd of or inſiſted on; not of near the Fame and Reputation with that other, of the *Unknown* Properties of Matter; I thought it did not deſerve to be treated with much Ceremony; and that I would not make a *Trifle* conſiderable, by a formal Proceſs of Argument, till thoſe who have a value for it, ſhould do it, by their own vain Pretenſions and Boaſts of its Strength.

I ſhall therefore only leave them theſe *three Propoſitions* upon it, which they may conſider; and if they don't ſee either the *Truth* or *Concluſiveneſs* of them, with reſpect to the preſent Purpoſe, I ſhall be ready at any time, when they deſire it, to make both out to them: but I believe, they themſelves will ſave me that *little* Labour.

PROP. I.

To Infer the Poſſibility of ſuch and ſuch Things or Effects, meerly becauſe a Contradiction does not reſult from the comparing or joyning ſuch and ſuch Ideas together; Is in an Infinite Number of Caſes, a downright Falſe and Erroneous way of Arguing.

PROP. II.

That for that Reaſon; '*tis* notoriouſly *Fallacious and Sophiſtical, to argue thus, in any Particular Caſe, without firſt aſſigning proper Limitations and Reſtrictions (drawn from the Specifick Nature of that Caſe) which may ſhew, that notwithſtanding the general Falſity of this way of Reaſoning, it will however conclude rightly under ſuch or ſuch Circumſtances:* And for Example, that it will do ſo, in this very Caſe, of Matter and Thinking Subſtance.

PROP. III.

That theſe Perſons might with Incomparably more Truth and Advantage in every reſpect, have inferr'd, that Matter could not be Thinking Subſtance; *From the Natural UNFITNESS of the Ideas, to one another; from that manifeſt UNSUITABLENESS between* INTELLIGENT, and Figur'd or Diviſible; between MIND, and Length, Breadth or Thickneſs; between an ACT of REASON, and an Act of Puſhing, Drawing, or any ſort of Motion: *Than they could ever infer*, that Matter might be Thinking Subſtance, *from the not reſulting of a Contradiction upon the comparing of theſe Ideas.*

For the *Firſt* is a demonſtrably true way of Arguing; and the *Latter*, as demonſtrably a Falſe one. In a word, 'tis all a perfect Jeſt, and I am almoſt aſham'd to have ſaid even thus much of it.

SECT.

SECT. VII.

TO Sum up all now: The Reſult of the preſent Enquiry is this, *That no Part or Branch of* the Hypotheſis of *Matter's Thinking*, is any longer tenable; And therefore they may wrangle and diſpute indeed, make bold precarious Aſſertions, or as boldly and ſtubbornly deny; They may ſurmiſe, gueſs, heſitate, demurr, query, talk ambiguouſly, with other ſuch little Artifices, according to their uſual Methods, for ſupporting the Credit of a forlorn Scheme, amongſt their own credulous Party: But *maintain* it, they never can (I make no doubt to ſay) with the utmoſt Efforts they'll ever be able to make.

To make good their Ground, upon the Foundation of the KNOWN Properties of Matter; *They muſt cut their way through all the Preſent Laws of Nature*, and Eſtabliſh a Philoſophy entirely different from all that obtains, and is ſupported both by certain *Demonſtration*, and as certain *Experiment*.

The Defence of the UNKNOWN Properties, can be made but two Ways:

One way; *in defiance of all Good Senſe and Philoſophy*; and *implicit Contradiction*, to the very Hypotheſis of *their being Unknown*; and no Safety at all, as to FUTURITY.

The *other* way: more conſiſtently with Good Senſe and Philoſophy; but with a diſmal Proſpect as to HEREAFTER; ariſing from an abſolute *Phyſical* Certainty, of ANOTHER STATE OF THOUGHT and REFLECTION, unleſs the Miraculous Power of Almighty God interpoſes, which I have ſhewn they muſt not pretend to.

As for God's *Superinducing* the Powers of Thinking and Willing, upon a Syſtem of Matter: It's either running upon *a plain Contradiction*, Talking what all the Philoſophical World will call *Nonſenſe and Impertinency*, or elſe giving up the Cauſe of MATERIALISM, for ever, and at one Stroke.

And Laſtly, as for the *May-be*, the pure Poſſibility of *Matter's* being *Thinking Subſtance*, upon the Score of *the not*

reſult

reſulting of a Contradiction from the Conjunction of Ideas: *The Argument is plainly faulty and vicious*, and cannot proceed.

So that upon the Whole, they have nothing to ſay in this Diſpute, but what muſt either expoſe their *Philoſophy*, or betray their *Cauſe*.

SECT. VIII.

BUT after all, not to diſſemble the Matter, but do theſe Gentlemen *that Juſtice*, which I am fully convinc'd is owing to them; I muſt declare, that I make no queſtion, but they can (*ſome* of them at leaſt) eaſily extricate themſelves out of theſe Inconveniences. For they have *one General Salvo*, which removes all Difficulties, and makes all Objections whatſoever ſit light and eaſy. This is *the Nature and Attributes of THEIR God Almighty*. If you ask what that is? I anſwer, It is either THE GREAT UNIVERSE, *The Entire Maſs, and Frame of Things*, or, *The*

The Vaſt Extended SPACE, *in which all Corporeal Beings are comprehended.* This is THEIR *Infinite, Eternal, Neceſſary, Self-Exiſtent* Being. *This* is what they fallaciouſly inveſt, with the Attributes of a *True and Real Deity*; and under this Mask impoſe upon all they talk to; while they diſcourſe of *God* with as good a Grace, and in the very *ſame Stile*, that the moſt devout Believers of his Exiſtence do. 'Tis by this crafty Ambiguity they have ſo long abus'd Mankind, and gain'd the good Quarter of being treated as DEISTS; a Name they have taken upon themſelves meerly for Protection, and to ſerve as a *Paſs*, to carry them through the World without being baited and worried. For *bare-fac'd* ATHEISM is a moſt hateful and diſagreeable thing; and that Man ſufficiently tries the Good Nature of his Fellow-Creatures, that dares to profeſs himſelf ſuch a Monſter.

Now pray what is ever to be *fear'd* or *hoped* for, from *ſuch a Deity*, ſuch a God Almighty as THEIRS is? Will INFINITE SPACE be *Kind* or *Angry*, *Reward our Good Works*, or *Puniſh our Evil ones?* Does SPACE Iſſue out *Laws* to *Mankind*, and make *Promiſes* and *Threatnings?* or will it form it ſelf into an HEAVEN and HELL?

What a pretty Story is all *Divine Revelation* and *Inſpiration*, in ſuch an Hypotheſis? A *Prophet* inſpir'd by *Infinite Space!* An *Apoſtle* of the ΤΟ ΠΑΝ! A *Preacher of the Mind and Will of the Great Univerſe!* What Stuff's here? What a fatal Neceſſity do theſe People lay themſelves under, of turning all theſe Things into meer Banter, by prepoſſeſſing themſelves with this vile Scheme? Indeed, 'tis ſcarce poſſible for them, *as Rational Creatures*, to do otherwiſe; with ſuch wretched and degenerate Notions of *a Deity*, as theſe are. 'Tis no wonder, that *Fools make a Mock of Sin*; that they laugh at the *King of Terrors*, and pretend not to fear making the Experiment, of venturing out into a *New World*. No; what ſhould they be afraid of, upon their *own* Principles? Indeed, perhaps *Conſcience* may ſometimes give a ſudden Start, and go into a little Diſorder; but their *Scheme* is ſafe and eaſy, and gives them no Diſturbance at all.

What's Dying, but falling back into the Arms of PARENT NATURE? And will Indulgent Nature hurt her own *Off-ſpring*? Will ſhe be ſevere upon *Parts* of Herſelf? To *die*, is but to change Shape and Place in the *Grand Machine*, and become a *Lump* differently modified from what it was before. And is there any Harm in all this? Who would be afraid of *ſtanding at the Tribunal* of SPACE, or giving up an *Account*, to *the General Syſtem of all Things*? And therefore what ſignify any Difficulties theſe People are preſs'd with, whether about *Matter* or *Spirit*, or any thing elſe; when they have *an Infallible Solution for all*, in this Hypotheſis; by the help of which, they can ſecure themſelves from any Conſequences; *can grant any Premiſſes, and yet deny any Concluſion whatſoever?*

In ſhort, theſe Matters muſt be remedied: Things muſt never be at this Paſs.

But more of this in *another place.*

I have a Scheme to propoſe (and I'll endeavour to put it out of their Power, to make any Exceptions againſt it, but what ſhall be ſcandalous) by which, I hope, we may diſpute with theſe *Maſquerading* People, upon more advantageous Terms.

FINIS.

ADVERTISEMENT

Concerning the

Longitude.

IT is now well towards Half a Year, ſince Mr. *Whiſton* and *My ſelf*, publiſh'd our *firſt Propoſal*, concerning a Method we had diſcovered for Aſcertaining the LONGITUDE. And amongſt all the *various Effects* it has produc'd in the *Town*; there is *but One*, that I know of, but what has happen'd exactly according to *Calculation*.

Advertiſement.

We knew very well,ſome People would *believe* us: and ſo it has happen'd. And we were as ſure others would *oppoſe* us: and the Event has anſwer'd accordingly.

We ſaw all the Creatures of *Trap* and *Diſcovery*, at work to ſmell out the Secret; with thoſe of the *Snearing* and *Grinning* kind, in their proper Employments of *Ridicule* and *Grimace*.

More than this; We prognoſticated an *Eclipſe of the Reputation of our Project*; by *what Interpoſitions* it muſt be caus'd, from *what Quarter* it would begin, and pretty nearly *how long* 'twould laſt (at leaſt in our own Country) and laſtly,*how many Digits* it would amount to: nor do we as yet ſee any Reaſon to recede from what we have thus determin'd. In ſhort, all the Town has been *merry*, or *angry*, or *grave* and *ſerious*, upon the Occaſion.

But I acknowledge our Art fail'd us as to *one Event*; and that is, *that ſome Perſons would give out, that they had Poſitive Orders to diſabuſe the Town, and expoſe the Vanity and Falſhood of our Pretenſions.* This, indeed, we did not foreſee: But I deſire thoſe Gentlemen (whoever they are) *to teſtify thus much to the World, by one plain open Advertiſement*, with their NAMES ſet to it. And if they pleaſe too (ſince it will conduce ſo much the more to the *Diſabuſing of the Town*) let them add *the Name of the Perſon*, who gave them this Commiſſion; and ſay, whether they were order'd to tell the Town, we pretended to find Longitude by *Soundings*, and *drawing Maps at the Bottom of the Sea.* I beg them to ſtrug- a little with the Reluctancies of Nature and Temper; and try for *once*, to conquer the Difficulties of acting a fair and generous Part; ſo far, as to aſſure the World, *they had ſuch Orders*, and *from whom.* If they *do do this*, they will but lay me under a Neceſſity of proving them guilty of a *Romance*; and if they *don't*, they'll ſave me the labour, and prove it *themſelves.* But I deſire them not to take any Handle from hence, to ſhift off the *Advertiſement.* For tho' I put the Caſe thus, *both ways*, and ſhew what muſt follow, *upon either Suppoſition*; the Deſign on't, is not at all to diſcourage them from doing the good Office they are ap-pointed to, *of opening the Eyes of the People*. No, by no means: I would have the Eyes of the People fully open'd, and theſe Gentlemen, the *Happy Inſtruments* of ſo Uſeful a Work: and may they have all the Glory, that a faithful and diligent Execution of their *Orders*, can entitle them to. All that I intend, is only to ſpur them on, to the doing of what, they declare, is a *Duty* incumbent on them.

But after all; perhaps it may be thought, that theſe Gentlemen deſerve a conſiderable Share of our *Thanks*, for the many *very idle Reports* they have been pleas'd to ſpread about the Town, concerning our Method for finding the *Longitude*. For it ſeems to bid fair for a Demonſtration, that *they had never taken this Courſe, if they had not had ſome ugly Suſpicions, there was ſomething in the Wind*. Becauſe had we been ſo far forſaken of all good Senſe, as to think of ſuch arrant Whimſies, as they have endeavour'd to poſſeſs the Town with a Notion of; yet when they had found it out, *they ſhould have kept their own Counſel, and let us alone*, that we might have expos'd our-

ſelves.